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ABSTRACT

Among 53 conference papers, are the following: "Perceptions of Administrators, Guidance Counselors, and Science Teachers Concerning Pilot Agriscience Courses" (Johnson, Newman); "Relationship of Supervised Agricultural Experience Program Participation and Student Achievement in Agricultural Education (AE)" (Cheek et al.); "Student Achievement, Attitudes, and Thinking Skill Attainment in an Integrated Science/Agriculture Course" (Enderlin, Osborne); "The Relationship of School Location and Student Achievement in Ohio Public Schools" (Peasley, McCracken); "Affect of Learning Style on Academic Achievement and Perceptions of Two Methods of Instruction" (Marrison, Frick); "Achievement of Students Entering the College of Agriculture at the University of Idaho--1985 to 1989" (Rush, Riesenberg); "Experiences Related to the Leadership Skills of College of Agriculture Students" (McKinley, Birkenholz, Stewart); "Analysis of 4-H Participation and Leadership Life Skill Development in Texas 4-H Club Members" (Boyd, Herring, Briers); "Drug Use by AE Students" (Raven); "Comparison of Deterrents to Nontraditional Male and Female Enrollment in Secondary AE Programs in Nebraska" (Bell, Fritz); "Teacher Perceptions of Agriscience and Natural Resources Curriculum" (Connors, Elliot); "Community Educational Advisory Councils and Agricultural Education Program Status in Illinois" (Legacy, Apantaku); "Analysis of Agricultural Mechanics Safety Practices in Texas Agricultural Science Programs" (Lawver); "How Safe Are Vocational Education Laboratories?" (Gliem, Miller); "Entry Year

AE Teachers' and Entry Year Assistance Committee Members' Perceptions of the Oklahoma Entry Year Assistance Program" (Barrera, Finley); "Extent of Use of the Problem-Solving Approach by First-Year Teachers of Agriculture" (McKee, Warmbrod); "Three-Year National Study of Teacher Educator, Supervising Teacher, and Student Teacher Perceptions Concerning the Selection of Student Teaching Centers and Supervising (Cooperating) Teachers in Agriculture" (Larke, Norris, Briers); "Nationwide Examination of Middle School Enrollment in AE and Membership in the National Future Farmers of American Organization" (Rossetti, McCaslin); "Agricultural Instruction in the Middle School" (Brown, Stewart); "Core Curriculum for a National Middle School AE Program" (Frick); "Benefits and Problems of Part-time Agricultural Employment of Secondary Agriculture Teachers on Their Programs as Perceived by Head Teacher Educators and Head State Supervisors" (Harper et al.); "Comparison of Computer Multimedia Instruction Versus Traditional Instruction in Postsecondary AE" (Marrison, Frick); and "Analysis of Agriscience Teacher Inservice Needs" (Neason). (MN)

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Adding Value Through Research

In Agricultural Education

Volume XIX

The Proceedings of The National
Agricultural Education Research Meeting

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December 4, 1992
St. Louis, Missouri

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Preface

The National Agricultural Education Research Meeting (NAERM) is a forum focusing on research in the field of Agricultural Education. The NAERM is held annually in conjunction with the American Vocational Association Convention. The quality of the meeting has continued to grow since the first meeting in 1974.

This year's program has involved individuals from a large number of states across the United States and several individuals from other countries. There were 94 presenters involved in the 1992 program. An additional 36 participants assisted in the program as chairpersons, facilitators, and discussants. A total of 96 papers were submitted for consideration for presentation at this nineteenth meeting. Each paper was reviewed and evaluated by four members of the profession. Using the ratings assigned by these reviewers, the top 44 papers were accepted for presentation at the conference. This information represents a 45.8% acceptance rate. In addition, another eight papers were accepted for publication in the proceedings as alternate papers. When these additional papers were included, the acceptance rate was 54.2%. This year's program represents an increase by eight papers over the number of papers presented during the 1991 NAERM.

All paper proposal titles and authors are listed in the proceedings. Seven criteria were established _a priori_ for use in making decisions regarding acceptance of papers for NAERM. These criterion included: 1) Had to follow paper specifications, 2) Had to be among the highest rated papers as ranked by evaluators, 3) Had to have at least 185 points out of a possible score of 308 points, 4) Had to have two ratings of either a 4 or 5 or combination of 4 and 5, 5) Had to have 3.00 or higher average rating, 6) Could not have two rejection ratings of 1 or 2, 7) Comments given should support paper's presentation. These criteria were identical to those used for the 1991 meeting.

The purpose of the NAERM are presented here to remind us of our focus*.

1. To present and disseminate the most recent and best research on the national level as judged by referees.

2. To present and disseminate critiques of the research by researchers in the profession.

3. To provide a forum for discussion of research in agricultural education.

4. To provide feedback to authors regarding research procedures and methodology used.

5. To provide suggestions to authors for preparing manuscripts for publications.

6. To give novice researchers an overview of current research issues, methodology, and critique within the profession.

7. To improve the quality of research conducted in future years.

8. To identify and recognize the Outstanding Paper Presentation at the National Agricultural Education Research Meeting on an annual basis.

9. To provide a written record of quality research completed and professional critique over time.

10. To broaden horizons and chart new directions for the conduct of agricultural education research in the future.

*Outlined and presented by Al Mannebach in the Preface to the 1987 NAERM Proceedings.

The standard of excellence for the 1992 NAERM was established by those who chaired previous meetings. The 1992 NAERM is the nineteenth meeting in a series of distinguished meetings. Previous meetings and their respective chairpersons are listed below:

Previous Meetings and Chairpersons

1. 1974 - New Orleans, LA - Hollie Thomas, Florida State University
2. 1975 - Anaheim, CA - Hollie Thomas, Florida State University
3. 1976 - Houston, TX - Glen Shinn, Mississippi State University
4. 1977 - Atlantic City, NJ - William Richardson, Purdue University
5. 1978 - Dallas, TX - Bennie Byler, Mississippi State University
6. 1979 - Anaheim, CA - Ronald Brown, Mississippi State University
7. 1980 - New Orleans, LA - L.H. Newcomb, The Ohio State University
8. 1981 - Atlanta, GA - Maynard Iverson, North Carolina State University
9. 1982 - St. Louis, MO - Dale Oliver, Virginia Tech State University
10. 1983 - Anaheim, CA - Paul R. Vaughn, New Mexico State University
11. 1984 - New Orleans, LA - Jimmy G. Cheek, University of Florida
12. 1985 - Atlanta, GA - Bob Stewart, University of Missouri
13. 1986 - Dallas, TX - Alan A. Kahler, Iowa State University
14. 1987 - Las Vegas, NV - Alfred J. Mannebach, University of Connecticut
15. 1988 - St. Louis, MO - Edgar P. Yoder, The Pennsylvania State University
16. 1989 - Orlando, FL - Michael F. Burnett, Louisiana State University
17. 1990 - Cincinnati, OH - Robert A. Martin, Iowa State University
18. 1991 - Los Angeles, CA - Larry R. Arrington, University of Florida

It is hoped that the proceedings of the 1992 NAERM will be useful to everyone in the agricultural education family as well as other professionals interested in research in agricultural education. Additionally all presenters are encouraged to submit their work for possible publication in a professional journal. It is time to begin preparing for the 1993 NAERM. Please submit paper proposals for consideration to Dennis C. Scanlon and Thomas H. Bruening, Pennsylvania State University. Any comments you may have about this year's procedures or suggestions for improvement of future meetings will be appreciated.

John P. Mundt, Chairperson
1992 National Agricultural Education Research Meeting

Acknowledgments

It has been an honor and a privilege to have the opportunity to serve Agricultural Education as the Chairperson of the National Agricultural Education Research Meeting. The successful completion of this task would have been impossible without the dedicated support, assistance and service of others to whom I am sincerely grateful. An undertaking of this magnitude required the involvement and cooperation of many people. I want to acknowledge and express my appreciation to a number of individuals who helped make this meeting successful: to Larry Arrington and Robert Martin - NAERM Chairpersons for 1991 and 1990 respectfully - who provided guidance and assistance whenever called upon; to Steve Harbstreit, Chairperson, Research Committee, Agricultural Education Division, American Vocational Association, and to the Research Committee Members for sponsoring and assisting in conducting the meeting; to Robert Stewart, Program Chairperson, Agricultural Education Division, American Vocational Association, who made many arrangements and coordinated the overall program planning effort; to Larry Branen, Dean of the College of Agriculture and Lou Riesenberg, Head of the Department of Agricultural Extension Education at the University of Idaho for providing the needed administrative support for the successful completion of this program; to all participants in the program - reviewers, facilitators, discussants, presenters, outstanding paper evaluators, and registration workers - whose efforts resulted in an excellent conference; and to all members of the profession who submitted research paper proposals and permitted their work to be judged by their peers. Finally, and perhaps most importantly, my very special thanks to Nancy Bozett, Stephanie Fox, Jill Knutson Hedgpeth, and Jacque Edmison - secretaries at the University of Idaho Boise Center. Without their support and diligent effort, the preparations for this conference could not possibly have been completed in a timely fashion.

A special "thank you" is due to the following Agricultural Education professionals who served as reviewers and whose work provided the basis for the objective selection of papers to be presented.

Reviewers

- L. R. Arrington, University of Florida
- Connie D. Baggett, Pennsylvania State University
- Matt Baker, California State Polytechnic University
- Robert J. Birkenholz, University of Missouri
- Blannie E. Bowen, Pennsylvania State University
- Gary E. Briers, Texas A & M University
- Michael F. Burnett, Louisiana State University
- Ben L. Byler, Tennessee Technological University
- Susan S. Camp, State University of New York
- William G. Camp, Virginia Polytechnic Inst. and State University

- David E. Cox, University of Arizona
- John R. Crunkilton, Virginia Polytechnic Institute and State University
- Jacquelyn P. Deeds, Mississippi State University
- Thomas Dormody, New Mexico State University
- Richard M. Foster, University of Nebraska
- Stacy A. Gartin, West Virginia University
- Janet L. Henderson, Ohio State University
- David Howell, University of New Hampshire
- Maynard J. Iverson, University of Georgia
- Larry R. Jewell, North Carolina State University
- Carla Kirts, University of Alaska
- Alvin Larke, Jr., Texas A & M University
- Jasper S. Lee, Mississippi State University
- James Leising, University of California
- Vernon D. Luft, University of Nevada
- Alfred J. Mannebach, University of Connecticut
- Robert A. Martin, Iowa State University
- W. Wade Miller, Iowa State University
- Larry E. Miller, Ohio State University
- Eddie A. Moore, Michigan State University
- Clifford Nelson, Washington State University
- Edgar A. Persons, University of Minnesota
- Carl L. Reynolds, University of Wyoming
- Lou E. Riesenberg, University of Idaho
- Dennis C. Scanlon, Pennsylvania State University
- C. Van Shelhamer, Montana State University
- Glen C. Shinn, Clemson University
- Gary S. Straquadine, Utah State University
- Michael K. Swan, North Dakota State University
- H. Robert Terry, Oklahoma State University
- William L. Thuemmel, University of Massachusetts
- David C. Whaley, Colorado State University

In addition, the following members of the profession gave their time, efforts and expertise in the conduct of the meeting. Their efforts were sincerely appreciated.

Discussants

- Blannie E. Bowen - Pennsylvania State University
- Richard I. Carter - Iowa State University
- Julia A. Gamon - Iowa State University
- Joe W. Kotrlik - Louisiana State University
- Alfred J. Mannebach - University of Connecticut
- Robert A. Martin - Iowa State University
- Larry E. Miller - Ohio State University

- Carl L. Reynolds - University of Wyoming
- H. Dean Sutphin - Cornell University
- Michael K. Swan - North Dakota State University
- J. Robert Warmbrod - Ohio State University

Chairpersons

- Connie D. Baggett - Pennsylvania State University
- Gary E. Briers - Texas A & M University
- Stanley R. Burke - Virginia Tech
- Susan S. Camp - State University of New York
- David E. Cox - University of Arizona
- Jack F. Elliot - University of Arizona
- David E. Hall - Pennsylvania State University
- Jerry L. Peters - Purdue University
- Steven E. Poe - Utah State University
- Robert Terry - Oklahoma State University
- M. Susie Whittington - University of Idaho

Facilitators

- Thomas H. Bruening - Pennsylvania State University
- James Connors - Michigan State University
- Joe A. Gliem - Ohio State University
- Ray V. Herron - University of Georgia
- Tracy S. Hoover - Pennsylvania State University
- Alvin Larke - Texas A & M University
- Vernon D. Luft - University of Nevada
- Glen M. Miller - University of Arizona
- AnnaBeth Neason - Louisiana State University
- Lou E. Riesenberg - University of Idaho
- Timothy J. Rollins - Pennsylvania State University
- Rosemarie Rossetti - Ohio State University
- Dennis C. Scanlon - Pennsylvania State University

Registration Personnel

- Thomas H. Bruening - Pennsylvania State University
- Dennis C. Scanlon - Pennsylvania State University

Outstanding Paper Presentation Evaluators

The Outstanding Research Paper Presentation Committee is a sub-committee of the Research Committee, Agricultural Education Division, American Vocational Association. The purpose of the committee was to select the Outstanding Research Paper

Presentation at the annual NAERM. The chairperson of the Committee this year was Leon G. Schumacher, University of Missouri. Committee members were David E. Lawver, Texas Tech. University, and Tracey S. Hoover, Pennsylvania State University. The Committee identified evaluators to rate the presentations made at the meeting. Research paper presentations for the 1992 NAERM were evaluated by discussants, session chairpersons, and facilitators. Their efforts were appreciated very much.

The individuals listed above contributed considerable time and effort to the 1992 NAERM. The contribution of time, energy, and expertise by many individuals across the profession made the meeting a success. I extend my sincere thanks and appreciation to everyone who assisted in making the 1992 NAERM a worthwhile and stimulating event. I consider it a real honor to have served as the NAERM chairperson. This meeting was a success because of the help of others. My sincere thanks to all members of the profession. Your support and assistance was very much appreciated.

John P. Mundt, Chairperson
1992 National Agricultural Education
Research Meeting

PERCEPTIONS OF ADMINISTRATORS, GUIDANCE COUNSELORS AND SCIENCE TEACHERS CONCERNING PILOT AGRISCIENCE COURSES

Donald M. Johnson
Michael E. Newman
Mississippi State University

INTRODUCTION

In 1988, the National Research Council (NRC) recommended that "efforts should be expanded and accelerated to upgrade the scientific and technical content of vocational agriculture courses" (p. 35). According to the NRC, this change was necessary to better prepare students for both advanced study and for employment in growth sectors of the food and fiber industry.

Agricultural educators in Mississippi reacted to the NRC's recommendations by developing two full-year agriscience courses to be pilot-tested in selected schools. Introduction to Agriscience is a one hour, one credit course targeted at 9th or 10th grade students. Agriscience I is a two hour, two credit course targeted at 11th or 12th grade students. (A third course, Agriscience II, is under development.)

The objectives for the courses were developed by faculty in the Division of Agriculture, Forestry, and Veterinary Medicine at Mississippi State University with input from selected agriculture teachers and state staff members. An *Agriscience Learning Activities Manual* was also developed, with members of various departments in the Division contributing learning activities in their areas of expertise.

According to Johnson (1991), the new courses were "designed to teach the scientific principles which form the basis of the modern food and fiber industry and to provide students with active, hands-on learning experiences which emphasize the scientific method in the study of agriculture" (p.1). The courses were designed so that academic science credit could be requested for agriscience if the courses are approved for statewide implementation (Johnson, 1990).

Agricultural education supervisory staff members of the Mississippi State Department of Education selected 42 teachers (employed in 41 secondary schools) to pilot-test the new agriscience courses. The schools and teachers were selected so as to be representative of schools and teachers offering secondary agricultural education programs in Mississippi (J.W. Jones, personal communication, June 10, 1991).

During June 1991, a two-week intensive inservice workshop was held for all teachers selected to teach the new agriscience courses. In fall 1991, the agriscience courses were implemented for a three year pilot-test period.

Agriscience represents an innovative curriculum shift for Mississippi secondary school agricultural education programs. According to Carpenter-Huffman, Hall, and Sumner (1974), curriculum innovations "will be welcomed by many teachers and administrators who enjoy learning new techniques, but there will be some resistance because of inertia" (p.9).

Carpenter-Huffman et al. (1974) and Connelly and Clandinin (1988) indicated that understanding the perceptions of influential stakeholders is essential for successful implementation of innovative educational programs. Connelly and Clandinin (1988) defined a stakeholder as "a person or group of persons with a right to comment on, and have input into, the curriculum program offered in schools" (p.124).

Previous researchers have identified school administrators and guidance counselors as influential school-based stakeholders in agricultural education programs (Magill & Leising, 1990; Matulis & Osborne, 1990).

Due to the nature of the curriculum being implemented, science teachers were also identified as important stakeholders in the pilot agriscience courses (Budke, 1991; Dormody, in press).

PROBLEM STATEMENT

The pilot agriscience courses are an innovative curriculum shift for Mississippi secondary school agricultural education programs. Local school administrators, guidance counselors, and science teachers are in positions to influence the success or failure of these courses. Agricultural educators need to understand how these three important school-based stakeholder groups perceive the pilot agriscience courses. Such an understanding would enable program planners to make timely and informed decisions concerning the pilot agriscience courses.

OBJECTIVES

The specific objectives of the study were to:

1. determine the perceptions of school administrators, guidance counselors, and science teachers (by group and overall) concerning selected aspects of the pilot agriscience courses;
2. determine the inter-relationships between perceptions of selected aspects of the agriscience courses; and
3. determine the level of cooperation between science and agriculture teachers as perceived by administrators and science teachers.

PROCEDURES

The population (N = 123) for this study was composed of one building-level administrator [principal (n=39) or vocational director (n=2)], guidance counselor, and science teacher from each of the 41 Mississippi public schools offering pilot agriscience courses during the 1991-1992 school year. The population members were identified by the agriscience teacher in each school. The entire population was surveyed.

Three instrument forms were developed for use in this study. In all three forms, a six-point, Likert-type scale was used to assess perceptions of selected aspects of the pilot agriscience courses. Each form also included space for open-ended comments about the pilot agriscience courses. On the administrator and science teacher forms, an additional item was included to determine the perceived level of cooperation between the science and agriscience teacher. Finally, the science teacher form also contained five yes/no questions concerning specific areas of cooperation between the science and agriscience teacher.

The instrument forms were developed by the researchers after input from a planning/advisory committee composed of three agriscience teachers, a graduate student, a science teacher, and an assistant state supervisor of agricultural education. The committee members also reviewed the instrument forms to ensure content and face validity and clarity. Since responses are reported on an individual item basis, overall instrument reliabilities were not estimated (Borg and Gall, 1983).

On April 20, 1992, a packet containing instruments, cover letters, and return envelopes (stamped and self-addressed) was mailed to the agriscience teacher in each school for distribution. The respondents were instructed to return the completed forms directly to the researchers.

Useable responses were received from 40 administrators (98%), 39 guidance counselors (95%), and 38 science teachers (93%) for an overall response rate of 95%. Because the group and overall response rates exceeded 90%, no follow-up of nonrespondents was conducted (Borg and Gall, 1983).

FINDINGS

As indicated in Table 1, the administrators, guidance counselors, and science teachers surveyed had positive perceptions of the pilot agriscience courses being offered in their schools. All groups agreed that the agriculture teacher in their school had explained the pilot agriscience curriculum to them.

The three groups strongly agreed that they supported the new agriscience curriculum. All groups agreed that science credit should be awarded for agriscience; however, science teachers agreed more strongly than either administrators or guidance counselors. Also, while all groups agreed that the agriculture teacher in their school was qualified to teach agriscience for science credit, science teachers expressed the highest level of agreement while administrators expressed the lowest level of agreement.

All groups agreed that high-ability students were more likely to enroll in agriscience than in other agriculture courses. At the same time, the respondents felt the agriscience curriculum was challenging to students of all ability levels.

All groups highly agreed that students planning to go to college and major in agriculture and non-college bound students planning to work in an agricultural occupation immediately after high school should take agriscience courses. However, to a lesser degree, the respondents also agreed that students planning to go to college and pursue a non-agricultural major and students planning to work in a non-agricultural occupation immediately after high school should enroll in agriscience courses. However, science teachers agreed less than administrators or guidance counselors that students planning to attend college in non-agricultural majors should take agriscience courses.

Table 1

Perceptions of Administrators, Guidance Counselors, and Science Teachers Concerning Selected Aspects of the Pilot Agriscience Courses.

Statement	Group*							
	Admin.(n=40)		G.C.(n=39)		S.T.(n=38)		Overall(n=117)	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
The agriculture teacher in my school thoroughly explained the new agriscience curriculum to me	5.25	.95	5.26	.92	5.18	1.09	5.23	.98
Science credit should be awarded to students for completion of agriscience course(s)	5.20	1.22	4.95	1.49	5.34	.81	5.16	1.21
The agriculture teacher in my school is qualified to teach agriscience for science credit	5.15	1.25	5.46	1.04	5.66	.53	5.42	1.01
I support the new agriscience curriculum being offered in my school	5.63	.87	5.74	.55	5.63	.59	5.67	.68
High-ability students in my school are more likely to enroll in agriscience than in other agriculture courses	4.83	.96	4.82	1.02	5.05	.87	4.90	.95
The content of the agriscience curriculum is challenging to:								
- high-ability students	4.79	.99	4.92	.81	4.75	.87	4.82	.89
- average-ability students	5.08	.98	5.09	.66	4.89	.78	5.02	.83
- low-ability students	4.89	1.09	4.60	1.19	4.40	1.42	4.63	1.24
The following students in my school should take agriscience courses:								
- students planning to go to college and pursue a non-agricultural major	4.37	1.32	4.36	.96	3.94	1.43	4.23	1.26
- students planning to go to college and pursue an agricultural major	5.68	.62	5.67	.58	5.73	.65	5.69	.61
- non-college bound students planning to work in an agricultural occupation immediately after high school	5.56	.75	5.55	.61	5.55	.65	5.56	.67
- non-college bound students planning to work in a non-agricultural occupation immediately after high school	4.24	1.44	4.58	.91	4.27	1.52	4.36	1.32

Note. Scale: 1 = strongly disagree; 2 = disagree; 3 = somewhat disagree; 4 = somewhat agree; 5 = agree; 6 = strongly agree

*Admin = School Administrators; G.C. = Guidance Counselors; S.T. = Science Teachers

Positive relationships existed between each of the paired statements. A very strong positive correlation (.72) existed between the level of agreement with awarding science credit for agriscience and the level of agreement that the agriscience teacher was qualified to teach agriscience for science credit. The inter-correlations between the remaining pairs of statements ranged from low (.10 - .29) to moderate (.30 - .49) using conventions suggested by Davis (1971). Table 2 presents the intercorrelation matrix for the paired statements.

Table 2

Inter-Correlations Between Level of Agreement with Selected Statements (n=117)

Statement	ATEXPLN	SCREDIT	ATQUAL	ISUPP	HAENROL
The agriculture teacher throughly explained the new agriscience curriculum to me (ATEXPLN)	1.00				
Science credit should be awarded to students for completion of agriscience courses (SCREDIT)	.47	1.00			
The agriculture teacher in my school is qualified to teach agriscience for science credit (ATQUAL)	.49	.72	1.00		
I support the new agriscience curriculum being offered in my school (ISUPP)	.48	.44	.48	1.00	
High-ability students in my school are more likely to enroll in agriscience than in other agriculture courses (HAENROL)	.19	.37	.21	.24	1.00

Both administrators and science teachers tended to agree that the science and agriscience teachers had worked together more closely since implementation of the agriscience courses. However, science teachers were in stronger agreement ($\bar{x}$ = 5.03; SD = .99) than were administrators ($\bar{x}$ = 4.75; SD = 1.01).

Over 80% of the science teachers reported sharing equipment, reference materials, and advice on science teaching techniques with their agriscience teacher. Only about one in five science teachers reported sharing facilities with their agriscience teacher. A summary of selected resources shared by the science and agriscience teachers (as reported by science teachers) is reported in Table 3.

Table 3

Resource Sharing Between Science and Agriculture Teachers as Reported by Science Teachers

Resource Category	Response			
	Have Shared		Have Not Shared	
	f	%	f	%
Equipment	29	80.6	7	19.4
Supplies	22	61.1	14	38.9
Facilities	8	22.9	27	77.1
Reference Materials	29	80.6	7	19.4
Advice on Science Teaching Techniques	31	83.8	6	16.2

The final item on each instrument form requested open-ended comments concerning the pilot agriscience courses. Overall, 29 (24.8%) of the 117 respondents provided written responses to this item. Within each group, 3 (7.5%) of 40 administrators, 11 (28.2%) of 39 guidance counselors, and 15 (39.5%) of 38 science teachers provided written comments.

Of the 29 written comments, four (13.8%) were classified by the researchers as being negative. The remaining 25 (86.2%) comments were classified as being positive.

Two of the negative comments concerned a lack of equipment for teaching agriscience. As stated by one administrator, "Could be and would be a very outstanding program if funds were available for teaching supplies and equipment." One guidance counselor felt the agriscience curriculum was "too broad." The final negative comment (guidance counselor) was that "The requirement for sciences in our district is only two. Since only two sciences are required, I feel we should at least require Biology and Consumer Science."

Ten of the 25 positive comments were general statements of support for the pilot agriscience courses. Example statements included "The agriscience program has been an asset to our curriculum" (science teacher) and "The agriscience curriculum has been an excellent addition to our schedule" (guidance counselor). Nine statements concerned the integration of agriculture and science in agriscience. As expressed by one science teacher, "I believe this course will bring science and ag together and make them real to students." Another science teacher stated that, "My students show this new knowledge in the classroom."

Four statements expressed support for granting science credit for agriscience. According to a guidance counselor, "I believe this course merits receiving science credit if taken prior to biology." A science teacher wrote, "I believe that this course will be of more benefit than either consumer science or applied life science to all students." The remaining two statements indicated that agriscience courses attracted a diverse group of students.

CONCLUSIONS AND RECOMMENDATIONS

The findings of this study indicated that administrators, guidance counselors, and science teachers in the schools having pilot agriscience programs support the new curriculum; therefore, the agriscience courses should be continued into the second year of the pilot test period.

Administrators, guidance counselors, and science teachers support granting science credit for agriscience. Science teachers agree more strongly with granting science credit for agriscience than do either administrators or guidance counselors. For this reason, science teachers should be viewed as an especially important advocacy group if science credit is to be requested for agriscience.

The level of agreement with granting science credit for agriscience was strongly related to the respondents' perceptions of the agriculture teachers' qualifications to teach agriscience for science credit. Each of the three respondent groups agreed that the agriculture teacher in their school was qualified to teach agriscience for science credit. Although these positive perceptions are encouraging, an assessment of agriculture teachers' knowledge of core science concepts and principles should be conducted. Such a study would provide a more objective measure of teacher science competency and would provide insight into possible inservice needs.

Although support exists for granting science credit for agriscience, further research should be conducted before science credit is requested. This research should focus on determining the level of mastery of selected science objectives by students enrolled in agriscience courses. To request science credit for agriscience without such information would be neither ethical nor prudent.

The administrators, guidance counselors, and science teachers in this study perceived the agriscience courses as being primarily for students planning to work in an agricultural career, regardless of college attendance plans. However, limited agreement exists that students not planning a career in agriculture should also enroll in agriscience courses. Therefore, agriscience courses may be used to provide agricultural literacy training for a wide range of secondary school students not currently being served by more traditional agricultural education programs.

Both administrators and science teachers agreed that resource sharing between the science and agriculture teachers had increased since implementation of the pilot agriscience courses. The agriscience courses are facilitating the linkages between science and agriculture teachers advocated by Budke (1991) and Dormody (in press).

In summary, the agriscience courses have the support of influential school-based stakeholders in the pilot-test schools. The challenge to those involved with agriscience is to build upon this support during the second and third years of the pilot-test period.

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PERCEPTIONS OF ADMINISTRATORS, GUIDANCE COUNSELORS AND SCIENCE TEACHERS CONCERNING PILOT AGRISCIENCE COURSES

A Critique

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The increased emphasis upon educational reform means that secondary agricultural education teachers will be involved with a number of new audiences and clientele groups. This shift in emphasis also means that secondary teachers will interact more with science teachers, administrators, counselors, and other individuals who heretofore may not have had close interactions with agricultural educators. This study focuses on one such shift in that the authors attempt to assess the perceptions of administrators, guidance counselors, and science teachers toward pilot agriscience courses taught by 42 secondary agricultural education teachers in Mississippi. The authors provide a good literature review as a basis for the study. The problem statement and objectives were well stated.

The authors should be commended on their methods and procedures. They studied the perceptions of 123 stakeholders in the school systems where 42 secondary agricultural education teachers taught pilot agriscience courses. The high response rate (95%) illustrates the relative level of interest in and commitment to seeing that the pilot courses are successfully implemented. In a similar vein, is the response rate a function of novelty and the subjects feeling important because their schools were asked to participate as pilot schools?

The findings provide a good indication of the perceptions of other educational professionals toward agriscience. In this study, the administrators, counselors, and science teachers were quite positive about the new courses and the implementation procedures. The science teachers were more receptive than the administrators and counselors to the idea of awarding science credit for the pilot courses.

Finally, the authors provide a number of conclusions and recommendations. It would be helpful for these to be sorted so the reader can better distinguish between what's being concluded versus recommended. From an implementation perspective, this section could be strengthened with a stronger focus on what the findings mean and how they will impact upon student enrollments.

Where do we go from here? As one compares the findings of this study and those of a related study included in this section (Newman and Johnson, 1992), one will perhaps question the extent to which the methodology that the authors used provides the caliber of enlightenment needed to effectively understand the politics, social dynamics, and interactions found in schools? Do we have the findings needed to understand how administrators, counselors, science teachers, and secondary agricultural education teachers really feel about these pilot courses? What types of interactions are needed to get these courses adopted on a broader scale? Could focus group interviews or related techniques provide the needed depth of understanding relative to human behaviors as they exist in a natural setting, i.e. the local school? In addition, what do students and parents think? Do the courses result in increased student learning and higher quality experiences or is this just a replacement for the old vo-ag courses?

Overall, the study was sound and offers promising findings about the types of new relationships that must be forged. However, if the researchers continue this line of inquiry, they should consider generating in-depth knowledge and insight about problems of this nature. Complex relationships often cannot be effectively addressed solely with survey methodology.

RELATIONSHIP OF SUPERVISED AGRICULTURAL EXPERIENCE PROGRAM PARTICIPATION AND STUDENT ACHIEVEMENT IN AGRICULTURAL EDUCATION[1]

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INTRODUCTION

The value of experiential learning in agricultural education has long been recognized as an important part of the educational process. The reason for this is that through practice and experience students apply what they have learned in real situations, thus the material becomes understandable and usable. Moreover, in the process of gaining experience, new problems and situations arise causing learners to seek additional information and new ways of applying what they have learned.

Experience provides relevance to the educational process. Dewey (1916) stated: "An ounce of experience is better than a ton of theory simply because it is only in experience that any theory has a vital and verifiable significance" (p.109). Dale (1946) used the "Cone of experience" to explain the inter-relationships of various learning experiences to their abstractness or directness. He classified the "doing" experiences as direct experiences, contrived experiences, and dramatic participation and indicated these experiences were the "bed-rock" of all education.

When using experiential learning, students must practice in real situations, model appropriate behaviors and procedures, and receive appropriate feedback and reinforcement. Also, there should be a lapse of time between practices so students are put in a situation where they must think as they apply their knowledge to various situations.

Supervised agricultural experiences (SAE) in agricultural education programs incorporate experiential learning and direct application of knowledge into students' curriculum to enhance learning. The SAE program is an essential part of the agricultural education program which consists of three integral components: classroom instruction, supervised agricultural experiences, and participation in the FFA. Agricultural education has always emphasized the "learning by doing" theory. This theory is exemplified in the SAE program. SAE gives the student the chance to utilize the principles learned in class and apply them to real life situations.

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THEORETICAL FRAMEWORK

Relatively few studies have been conducted investigating the relationship between supervised agricultural experience participation and student achievement. Morton (1978) and Noxel and Cheek (1988) concluded there was a positive significant relationship between the scope of a student's SAE program and achievement in agricultural classes. However, Potter (1984) who studied handicapped students mainstreamed into agricultural education programs and Tylke and Arrington (1988) did not find a positive relationship between SAE scope and student achievement. In 1990, Arrington and Cheek examined the relationship once more and discovered a significant positive relationship between SAE scope and student achievement for students in the tenth grade but not for students in the ninth grade.

This study was undertaken to provide additional research evidence about the relationship between SAE and student achievement in agricultural education. A comprehensive study of the literature revealed the following variables were related to student achievement, along with SAE involvement, and were therefore examined in this study: FFA involvement (Arrington & Cheek, 1990; Cheek & McGhee, 1985; Long & Israelsen, 1983; McGhee & Cheek, 1983; Noxel & Cheek, 1988; Potter, 1984; Smith, 1983; Tylke & Arrington, 1988); student interest in agriculture (Arrington & Cheek, 1990; Christensen, 1964; Neavill, 1973; Noxel & Cheek, 1988; Sjoberg, 1984; Tylke & Arrington, 1988); and years previously enrolled in agricultural education (Arrington & Cheek, 1990). Socioeconomic status had not been used as a variable in previous studies of this type, but a review of literature indicated it is related to student achievement (Coleman, 1940, Morgan, 1979), thus it was added as an independent variable in this study. Two variables, parental involvement and teacher effectiveness, were excluded from the study because in previous studies they were not shown to be related to student achievement (Noxel & Cheek, 1988; Tylke & Arrington, 1988; Arrington & Cheek, 1990).

PURPOSE AND OBJECTIVES

The primary purpose of this study was to investigate the relationship between supervised agricultural experience program scope and student achievement in agriscience, which included agricultural education courses in the tenth through twelfth grades. The primary research hypothesis stated there was a positive relationship between student achievement scores and SAE participation. In addition, the alternative hypotheses stated there was a positive relationship between achievement scores and the following independent variables: FFA involvement, student interest in agriculture, years previously enrolled in agriscience, and socioeconomic status.

PROCEDURES

Design

The design of this study was ex-post facto since the independent variables had already occurred, and the research began by studying the dependent variable. As suggested by Kerlinger (1964), rival hypotheses were stated before collecting data and then tested along with the major hypothesis.

Population and Sample

The population consisted of public high school classes of agriscience throughout Florida. A purposive sample of twenty-one high schools in Florida which taught agricultural education classes were selected. Of these schools, fourteen schools returned complete data which could be utilized in this study. The schools were situated in counties containing both rural and urban areas. Areas of study included animal and plant science, ornamental horticulture, and agricultural mechanics. The primary criteria for selecting schools for the study was that each school was recognized as having a comprehensive SAE program for students and that the teacher utilized a written final exam.

Instrumentation

Information on each student's SAE was collected by having each student complete a questionnaire supplying the following data: description or name of SAE activities, size and scope of SAE, and SAE income generated. Most ownership SAE projects were small scale horticulture, crops, or livestock projects. Most placement SAE's were on farms, ornamental nurseries, or agribusinesses.

Using an instrument devised by the researchers, the teachers were instructed to rate the SAE participation and activities of each student. Ratings could range from zero (No SAE or inappropriate SAE) to fifty (appropriate SAE, broad scope, much involvement, good records). The rating scale was included to help the researcher get a more accurate portrayal of the scope of the student's SAE activities. In order to overcome the effects of differences in teacher ratings and to standardize SAE scores, a professional assessment, derived from a comparison of the teacher's rating score and the actual computed score, was used to arrive at the final measurement score for SAE participation.

A second questionnaire was developed to collect data from students pertaining to the following variables: FFA involvement, student interest in agriculture, and socioeconomic status.

Teachers were instructed to rate student FFA involvement and activities. Ratings could range from zero (not a member or only paid dues) to fifty (attended meetings and participated in local, county, and state activities). Teachers were also asked to estimate each student's socioeconomic status from high (professional occupations) to low (laborer, unskilled, unemployed). A professional assessment, derived from a comparison of teachers' assessments and student data, was used to arrive at a final score for FFA involvement and socioeconomic status.

Student achievement was measured by the final examination developed and administered by the teacher. Because the final exam was "teacher made," no formal attempt was made to determine the validity or reliability of the instrument. However, the exam was designed to measure what students had learned in agriculture. Each student's score on the final exam was the measure of student achievement.

Data Analysis

Data were obtained from 537 students. Descriptive statistics were calculated to illustrate the characteristics of the sample in respect to the variables. Pearson product moment correlation coefficients were calculated to determine which of the independent variables were significantly related to the dependent variable at the $p<.05$ level. Step-wise multiple regression analysis was also used to enter each independent variable into the multiple regression equation. This analysis partials out the effects of a single variable at each step, while other variables are statistically controlled.

RESULTS

A student's achievement score was based on the score received on the teacher-made final exam which contained material taught throughout the school year in the specific agriscience class in which the student was enrolled. The scores on the final exams ranged from 14 to 96. The mean score was 83, and the standard deviation was 13.19.

Table 1 summarizes the SAE scope scores. The scores ranged from 0 to 50. The mean value was 24.18, and the standard deviation was 15.65.

TABLE 1
Frequency/Summary Statistics for Supervised Agricultural Experience Participation Scores

SAE Participation Scores	N	Frequencies Percentage	 Cumulative Percentage
0-10	123	22.9	22.9
11-20	95	17.7	40.6
21-30	128	23.8	64.4
31-40	116	21.6	86.0
41-50	75	14.0	100.0
Total	537	100.0	100.0

SD = 15.65
M = 24.18

Students provided information regarding their FFA participation by responding to questions on a questionnaire that determined their FFA involvement. Each answer was assigned a point value, and the teacher was asked to give each student a rating from 0 to 50 which best described the students' FFA involvement. The total points from the questionnaire and the teacher rating were incorporated into a final FFA participation score by a professional evaluator in order to standardize scores and eliminate teacher bias. The FFA involvement scores ranged from 0 to 50. The mean score was 22.13, and the standard deviation was 15.87.

Three questions on the questionnaire assessed student interest in agriculture and interest in pursuing a career in agriculture. These questions were scored using a Likert Scale, each offering five possible answers, with point values ranging from 1 to 5. The point values were then summed to arrive at an interest score for each student. The scores ranged from 3 to 15, with a mean of 11.81 and a standard deviation of 2.37. Sixty percent of the students had an interest score of 11 or higher indicating that the majority of students enjoyed their agriculture class, were very interested in agriculture, and were likely to pursue a career in agriculture.

Socioeconomic status was determined by the researchers, using the parents' occupations and educational levels. Students were grouped into one of three socioeconomic groups: low, intermediate, and high. Of the 535 students who responded to this question, 25.6% were classified in the low category, 61.7% were classified in the intermediate category, and 12.7% were classified as coming from a high socioeconomic background.

Pearson product moment correlation coefficients were calculated for all possible pairs of the variables. The results of this analysis can be found in Table 2. The Pearson correlation analysis revealed a significant, positive relationship between the dependent variable of student achievement and all of the independent variables: SAE involvement (.33), FFA participation (.42), interest in agriculture (.28), years enrolled in agriscience (.14), and socioeconomic status (.12).

TABLE 2
Pearson Product Moment Correlation Coefficients for the Variables

Variable	ACH	SAE	FFA	INT	SES
SAE Participation	.329*	---			
FFA Involvement	.417*	.638*	---		
Interest in Agriculture	.280*	.441*	.508*	---	
Socioeconomic Status	.119*	.147*	.190*	.158*	---
Years Enrolled in Agriculture	.137*	.281*	.285*	.202*	.018*

ACH = Achievement
SAE = Supervised Agricultural Experience Participation
FFA = Future Farmers of America Involvement
INT = Student Interest in Agriculture
SES = Socioeconomic Status
YIA = Years Enrolled in Agriculture
* p<.05

Step-wise multiple regression analysis was used to enter each independent variable into the multiple regression equation. This analysis partials out the effects of a single variable at each step, while other variables are statistically controlled. Table 3 summarizes the multiple regression analysis.

FFA involvement, SAE participation, socioeconomic status, interest in agriculture, and years enrolled in agriscience were entered into the equation. FFA was shown to be significant at the 0.05 level. SAE was not significant at the 0.05 level in the step-wise multiple regression equation, but was significant at the 0.11 level. Perhaps this can be explained by the strong correlation between SAE participation and FFA involvement (.64).

TABLE 3
Step-Wise Multiple Regression of the Independent Variables on Achievement in Agriscience Classes

Variable	R^2	F	Probability > F
FFA	.1731	96.7204	0.0001
SAE	.0047	2.6311	0.1055

CONCLUSIONS

The following conclusions were drawn:

1. The primary research hypothesis that supervised agricultural experience program participation is positively related to student achievement in agriscience was accepted. A moderate correlation was found between SAE participation and student achievement. FFA involvement and SAE scope were highly correlated (R=.638). SAE participation was not significant in explaining a significant portion of the variance in student achievement when step-wise multiple regression was calculated.

2. FFA involvement was shown to be significantly related to student achievement in agriscience and explained 17.31% of the variance in student achievement in this study as determined by a step-wise multiple regression.

3. Student interest in agriculture, socioeconomic status, and number of years in agriscience were shown to be significantly related to student achievement in agriscience, but when entered into the step-wise regression equation did not explain a significant part of the variance in student achievement.

RECOMMENDATIONS

The following recommendations were developed:

1 Teachers should encourage students and devise strategies to encourage students to actively participate in FFA and SAE.

2 Work needs to continue on developing more accurate measures of SAE participation that is more standardized to compensate for differences in teacher evaluation measurements.

3 FFA appears to be related to several of the other independent variables. Further research needs to be conducted examining FFA and its interrelatedness with various other variables.

4. Further research needs to be conducted to further explain and clarify the role SAE and FFA play in student achievement. This research and similar studies indicate that SAE and FFA are related and both are related to student achievement. The question remains, do high achievers participate more in SAE and FFA, or does participation in SAE and FFA improve achievement?

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RELATIONSHIP OF SUPERVISED AGRICULTURAL EXPERIENCE PROGRAM PARTICIPATION AND STUDENT ACHIEVEMENT IN AGRICULTURAL EDUCATION

A Critique

Blannie E. Bowen, The Pennsylvania State University--Discussant

The authors examine a significant topic that the profession has traditionally embraced as one of the cornerstones of a high quality secondary program, i.e. supervised agricultural experience. The study has a number of strengths. The authors built a basis for the study by delving into the literature to identify variables related to SAE quality. They also identified variables that were NOT related to their problem and did not include them in their study. This approach is commendable. Too many researchers ignore what we know and simply confirm existing knowledge. The authors resisted and built their hypotheses on empirical evidence.

Methodologically, the study was sound in most respects and the writing was succinct. Acceptable procedures were followed in most instances. However, a few questions will emerge as one reads the study. Twenty-one schools were purposively chosen because they had been recognized as providing comprehensive SAE programs. Also, teachers in the 21 schools gave written final exams. Although 14 teachers participated in the study, more details are needed on the seven who did not. Also, it would be helpful to know how the 537 students were distributed across the 14 teachers. Further, is measurement error a problem in the study? Although the 14 different *teacher made* final exams purport to measure what had been taught, are those tests valid and reliable? The use of a professional assessment to partial out variation associated with SAE scores, FFA involvement, and socioeconomic status strengthened the study. It would be helpful to know who made the assessments and how.

The major findings were that the students' earned a mean of 83 on the final examination (100 maximum), their SAE score was 24 (50 maximum), their FFA mean score was 22 (50 maximum), and about 60% of the students were in the intermediate SES category. Also, the final examination scores were moderately related to students' SAE participation. However, only FFA involvement could explain student achievement (R^2=.17) when a regression equation was developed and included SAE, interest in agriculture, SES, and years enrolled in agriculture. Other than FFA involvement, the authors do not have a good explanation of the variation in the final examination scores. Interestingly enough, SAE and FFA were substantially related (r=.64). However, from an insight standpoint, should the authors address the apparent low level of student performance relative to SAE and the FFA? Are the teachers NOT doing a good job? Are the expectations NOT realistic or perhaps too high? Such questions are crucial since the students earned a mean of 83 on the final examinations.

The recommendations are sound in most respects. However, given the purposive sampling, might the findings be an artifact of a biased sample and not generalizable as the authors assumed in their recommendations? Further, could the final examination scores be a function of measurement error since 14 different teacher made tests were used?

Where do we go from here? Considering their findings, the authors should perhaps take a different slant with this line of inquiry. With an increasing focus on outcomes based education, can they unlock the mystery behind student achievement? If SAE and FFA are in fact linked to classroom instruction, what can be done to enhance these relationships which were not especially strong? Also, how do we deal with teacher differences? Perhaps qualitative methods are needed to help answer these questions. The authors should continue this line of inquiry to better establish theoretical and empirical bases for the profession's tenet that classroom instruction, SAE, and FFA are highly interrelated.

PERCEPTIONS OF MISSISSIPPI SECONDARY AGRICULTURE TEACHERS CONCERNING PILOT AGRISCIENCE COURSES

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In 1988, the National Research Council (NRC) reported that "much of the focus and content of many vocational agriculture programs is outdated" (p. 3). The NRC recommended that agricultural educators move quickly to upgrade the scientific and technical content of the curriculum.

Mississippi agricultural educators responded to this recommendation by developing two pilot courses in agriscience for the 1991-92 school year. One course, Introduction to Agriscience, was designed as a one-hour, 9th and 10th grade level course. The other, Agriscience I, was designed as a two-hour, 11th and 12th grade level course. (A third course, Agriscience II, is under development.) In a report on the development of the courses, Johnson (1991) stated, "The courses were designed to teach the scientific principles which form the basis of the modern food and fiber industry and to provide students with active, hands-on learning experiences which emphasize the scientific method in the study of agriculture" (p. 1).

The objectives for the courses were developed by faculty in the Division of Agriculture, Forestry, and Veterinary Medicine at Mississippi State University, with input from selected teachers and state staff. An Agriscience Learning Activities Manual was also developed, with members of various departments in the Division contributing activities in their area of expertise.

Forty-one schools (42 agriculture teachers) were selected to serve as test sites for the pilot courses. The sites were selected to be representative of all current agricultural education programs in Mississippi in terms of school location, school type, school size, program quality, and teacher characteristics (J.W. Jones, personal communication, June 10, 1991). The 42 teachers attended a two-week inservice workshop in June 1991.

OBJECTIVES

The specific objectives of the study were to:

1. determine agriculture teachers' level of agreement with selected statements regarding the pilot agriscience program;
2. determine the relationship between teachers' level of agreement with statements regarding the pilot agriscience courses and the teacher demographic variables of: age, years of teaching experience, and level of education;
3. determine the degree of cooperation between the agriculture and science teachers as reported by the agriculture teachers; and
4. determine the percentage of teachers teaching each agriscience unit as reported by the agriculture teachers.

RELATED LITERATURE

Teachers are important stakeholders in educational change. Acceptance of changes by teachers is critical to the success of new educational programs (Norris & Briers, 1989). Other researchers have noted the association of teacher behavior and readiness for change with the success of school change (Goodlad, 1975; Owens, 1987).

Relationships between demographic variables and perceptions of educational programs have been reported by several researchers. Christiansen and Taylor (1966) found that the level of post-graduate education possessed by teachers and age of teachers can indicate their level of innovativeness--those with more education and those that are younger are more innovative. Norris and Briers (1989) found statistically significant negative relationships between perceptions of curriculum change and age and years of teaching experience, but reported the relationship involving level of education was inconclusive. In a study of Ohio teachers, Peasley and Henderson (1992) reported negligible relationships between level of agriscience curriculum being taught and age, years of experience, years at current position, and educational level.

Knowledge of what is actually being taught in agriscience courses is very important to those who make decisions on funding and accreditation of programs. Some agricultural education programs have changed the name of their program to agriscience, but continue to teach the same traditional subject matter (Gliem, 1991).

PROCEDURES

The population for this study included all Mississippi agriculture instructors teaching pilot agriscience courses during the 1991-1992 school year ($\underline{N} = 42$). The entire population was surveyed.

The instrument used in this study was developed by the researchers after reviewing the instrument used by Peasley and Henderson (1992). Input about content, format, and individual items were provided by a planning/advisory committee comprised of three agriscience teachers, one science teacher, one graduate assistant, and the assistant state supervisor of agricultural education.

The instrument contained four sections. Section one contained a six-point scale to determine the teachers' level of agreement with selected statements about the agriscience courses. Some items were stated negatively to identify possible response set. Section two contained a listing of individual units in each agriscience course. In this section the respondents indicated the agriscience units taught and the number of hours devoted to each unit. In section three, respondents were asked to provide information about the level of cooperation between the science teacher and the agriculture teacher during the school year. Respondents provided demographic information in section four.

The planning/advisory committee reviewed the developed instruments to establish face and content validity and clarity. Because responses are reported on an individual item basis, an estimate of the overall reliability for the instrument was not obtained.

Useable responses were received from 41 of the 42 teachers, for a response rate of 98%. The only nonrespondent is no longer teaching in Mississippi.

FINDINGS

The 41 teachers who responded to the study averaged 40 years of age (SD = 8.97) and had been teaching for 15 years (SD = 9.07). All of the teachers were male. The highest degrees held by the teachers were as follow: one had an associate degree; 15 had bachelors degrees; 17 had masters degrees; and 7 had educational specialist degrees. One teacher did not indicate a highest degree.

To assess the first objective of the study, the teachers were asked to indicate their level of agreement with 17 statements and substatements concerning several aspects related to the agriscience pilot courses. For the most part, the teachers responded uniformly in agreement with the statements written positively and uniformly in disagreement with the statements written negatively. The responses to each question are summarized in Table 1.

The teachers strongly agreed that science credit should be awarded to students completing agriscience courses. They agreed that the science teacher(s) in their school would support granting science credit for agriscience. The teachers also indicated the administrator(s), guidance counselor(s), and science teacher(s) in their school supported the program in general.

The teachers agreed the courses were appropriate for all students, whether they were going to college or not and whether they planned to work in an agricultural occupation or not.

The teachers agreed that the activities in the Agriscience Learning Activities Manual worked well with their students and that adequate instructional materials are currently available for teaching agriscience. They also agreed that they enjoy teaching agriscience more than other agriculture courses.

Respondents generally disagreed that the agriscience curriculum limits opportunities for supervised experience programs or FFA involvement. They also disagreed with the statement, "the agriscience curriculum does not meet the needs of the agricultural industry in my school district." The teachers somewhat disagreed that they had adequate equipment and supplies to teach agriscience.

For the second objective, Spearman-rank correlations were calculated on the 17 statements in Part 1 of the instrument and the demographic variables of age, years of teaching experience, and highest degree held. The correlations are presented in Table 2. Overall, little evidence was found of linear relationships between the demographic variables and teacher responses to the selected statements.

To assess the third objective, teachers were asked to indicate their level of agreement with the statement, "Teaching agriscience has caused me to work more closely with the science teacher(s) in my school" using the same six-point scale used with statements in Part 1. Teachers agreed with this statement (median = 5). Teachers were also asked to indicate whether they had shared various types of resources with science teacher(s) in their school. They were most likely to have shared advice on teaching science methods and least likely to have shared facilities. This information is summarized in Table 3.

Table 1

Level of Agreement of Agriscience Teachers with Statements Regarding Pilot Agriscience Courses

Statement	Percent Selecting Response						
	1	2	3	4	5	6	Median
Science credit should be awarded for agriscience.	0	0	0	4.9	7.3	87.8	6
My _____ support(s) the new agriscience curriculum.							
a. building administrator(s)	0	2.4	0	4.9	34.1	58.5	5
b. guidance counselor(s)	4.9	0	2.4	4.9	39.0	48.8	5
c. science teacher(s)	0	0	2.4	22.0	34.1	41.5	5
The following students in my school should take agriscience courses:							
a. those planning to go to college and pursue a non-agricultural major.	2.4	2.4	4.9	31.7	22.0	36.6	5
b. those planning to go to college and pursue an agricultural major.	0	0	0	2.5	17.5	80.0	6
c. non-college bound students planning to work in an agricultural occupation immediately after high school.	0	0	0	10.0	25.0	65.0	6
d. non-college bound students planning to work in a non-agricultural occupation immediately after high school.	0	5.0	10.0	25.0	35.0	25.0	5
High-ability students in my school are more likely to enroll in agriscience than in other agriculture courses.	2.4	2.4	2.4	12.2	39.0	41.5	5
The science teacher(s) in my school would support granting science credit for agriscience.	0	5.1	0	23.1	33.3	38.5	5
The student activities in the Agriscience Learning Activities Manual have worked well with my students.	0	0	2.4	31.7	48.8	17.1	5
I enjoy teaching agriscience more than other agriculture courses.	2.4	0	12.2	17.1	36.6	31.7	5
Student enrollment has increased because of the pilot agriscience program.	2.4	7.3	9.8	17.1	34.1	29.3	5
Adequate instructional materials are currently available for teaching agriscience.	2.4	9.8	9.8	22.0	41.5	14.6	5
I have adequate equipment and supplies in my department for teaching agriscience.	14.6	17.1	24.4	26.8	14.6	2.4	3
Students in agriscience have less opportunity for supervised experience programs than students in other agriculture courses.	43.9	29.3	9.8	4.9	7.3	4.9	2
Students in agriscience are less interested in the FFA than are other agriculture students.	51.2	19.5	7.3	12.2	7.3	2.4	1
An agriscience curriculum does not meet the needs of the agricultural industry in my school district.	58.5	36.6	4.9	0	0	0	1

Note. 1 = strongly disagree; 2 = disagree; 3 = somewhat disagree; 4 = somewhat agree; 5 = agree; 6 = strongly agree.

Table 2

Spearman-Rank Correlations Between Demographic Variables and Responses to Statements Regarding Pilot Agriscience Courses

	Demographic Variables		
Statement	Age	Years Taught	Highest Degree Held
Science credit should be awarded for agriscience.	-.05	-.06	.02
My ________ support(s) the new agriscience curriculum.			
a. building administrator(s)	.24*	.23*	.04
b. guidance counselor(s)	.33**	.36**	.15
c. science teacher(s)	.00	.13*	-.03
The following students in my school should take agriscience courses:			
a. students planning to go to college and pursue a non-agricultural major.	-.03	-.06	-.24*
b. students planning to go to college and pursue an agricultural major.	-.04	-.06	.06
c. non-college bound students planning to work in an agricultural occupation immediately after high school.	-.23*	-.33**	-.31**
d. non-college bound students planning to work in a non-agricultural occupation immediately after high school.	-.11*	-.08	-.33**
High-ability students in my school are more likely to enroll in agriscience than other agriculture courses.	-.03	-.11*	-.01
The science teacher(s) in my school would support granting science credit for agriscience.	-.20*	-.23*	-.14*
The student activities in the Agriscience Learning Activities Manual have worked well with my students.	.20*	.21*	.06
I enjoy teaching agriscience more than other agriculture courses.	-.26*	-.28*	-.19*
Student enrollment has increased because of the pilot agriscience program.	.06	-.08	.04
Adequate instructional materials are currently available for teaching agriscience.	.08	.00	-.12*
I have adequate equipment and supplies in my department for teaching agriscience.	-.03	.05	-.10*
Students in agriscience have less opportunity for supervised experience programs than students in other agriculture courses.	-.23*	-.08	-.05
Students in agriscience are less interested in the FFA than are other agriculture students.	-.14*	-.12*	-.04
An agriscience curriculum does not meet the needs of the agricultural industry in my school district.	-.06	.13*	.14*

Note. Using conventions established by Davis (1971), '*' indicates low associations and '**' indicates moderate associations. All other associations were negligible.

Table 3
Sharing of Selected Resources by the Science and Agriscience Teachers as Reported by Agriscience Teachers

Resource Category	Have Shared			
	Yes	No	Missing	Percent Yes*
Advice on Science Teaching Methods	36	4	1	90.0
Reference Materials	33	6	2	84.6
Equipment	32	7	2	82.1
Supplies	25	14	2	64.1
Facilities	9	29	3	23.7

*based on only those teachers responding to item.

For the fourth objective, the teachers were given a list of the units in the curriculum guides developed for the pilot agriscience programs and asked to indicate whether they had taught the units in their program. This information is summarized in Table 4 for the Introduction to Agriscience course and in Table 5 for the Agriscience I course.

Table 4
Units Taught in Introduction to Agriscience as Reported by Teachers

Unit	Did Teach			
	Yes	No	Missing	Percent Yes*
Introduction to Agriscience	38	0	3	100.0
Opportunities in Agriscience	38	0	3	100.0
Human Relations/Leadership in Agriscience	37	1	3	97.4
Principles of Animal Science	37	1	3	97.4
Principles of Plant Science	37	1	3	97.4
Supervised Agricultural Experience (SAE) in Agriscience	36	2	3	94.7
Application of the Scientific Method to Agriscience	34	3	4	91.9
Principles of Soil Science	34	3	4	91.9
Natural Resource Protection	33	4	4	89.2
Mechanical Technology in Agriscience	32	6	3	84.2
Principles of Food and Fiber Science	25	12	4	67.6
Computers in Agriscience	25	13	3	65.8
Principles of Entomology	22	16	3	57.9
Introduction to Biotechnology	22	16	3	57.9

*based on only those teachers responding to item.

Conclusions and Recommendations

The following conclusions and recommendations are based on the findings of this study and the review of the related literature.

The agriscience teachers strongly support the pilot courses. They believe the courses are beneficial to all students, especially those interested in working in

Table 5
Units Taught in Agriscience I As Reported by Teachers

	Did Teach			
Unit	Yes	No	Missing	Percent Yes*
Introduction to Agriscience	17	0	0	100.0
Leadership and Communications in Agriscience	17	0	0	100.0
Plant Propagation	16	1	0	94.1
Soil Science	16	1	0	94.1
Supervised Agricultural Experience (SAE) in Agriscience	16	1	0	94.1
Animal Science Technology	15	2	0	88.2
Plant Science Technology	15	2	0	88.2
Crop Production	14	3	0	82.4
Machinery and Power	14	3	0	82.4
Genetics	12	5	0	70.6
Pest Management	11	5	1	68.7
Computers in Agriscience	11	6	0	64.7

*based on only those teachers responding to item.

agriculture, either immediately after high school or after college. The teachers enjoyed teaching the courses and felt that the instructional materials and learning activities were appropriate. In addition, teachers perceive strong support from other stakeholders in their schools. This support should be further developed as the courses are revised during the pilot test period.

Teachers believe science credit should be awarded for the agriscience courses. Further research should be conducted to determine whether students are obtaining the necessary knowledge and skills in science before the pilot courses are submitted to the state accreditation board for consideration for science credit.

The relationships between teacher demographic variables and perceptions of the various aspects of the pilot courses have little practical significance. With the exception of which students would benefit from the courses and perceived guidance counselor support, all relationships between teacher variables and statements were either low or negligible. In this study, the demographic variables suggested by the related literature (Christiansen & Taylor 1966; Norris & Briers, 1989) do not appear to be good predictors of teacher perceptions of the pilot courses. This conclusion is consistent with the findings of Peasley and Henderson (1992). This finding may be explained by the high perceptions teachers hold about the different aspects of the courses. Responses to almost all statements were positive and varied little, so relationships to demographic variables were not evident.

Agriscience teachers have worked more closely with science teachers since the implementation of the pilot agriscience courses. Mississippi pilot agriscience teachers and science teachers are sharing resources to a greater extent than teachers nationally (Dormody, in press). The pilot agriscience courses appear to facilitate linkages with science teachers advocated by Budke (1991). Teachers should investigate strategies for sharing facilities to a greater extent to make better use of limited resources.

Teachers taught most of the units suggested in the curriculum guides for the pilot courses. Few teachers taught all of the units. This finding is not of immediate concern, because the teachers are determining appropriate content and scope of instruction in the process of the pilot test. However, if the refined courses become a permanent curriculum offering, the teachers should commit to teaching all units. This commitment may require additional inservice education and new equipment and supplies.

Overall, the teachers involved in the pilot test strongly support the new agriscience courses. This support is essential for the success of the pilot courses. The challenge to agricultural education leaders in Mississippi is to sustain and enhance the support throughout the pilot test period and beyond.

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PERCEPTIONS OF MISSISSIPPI SECONDARY AGRICULTURE TEACHERS CONCERNING PILOT AGRISCIENCE COURSES

A Critique

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The authors examine the perceptions of 42 purposively selected secondary agricultural education teachers who were chosen to teach pilot agriscience courses in Mississippi during the 1991-1992 school year. The authors provide a basis for the study by reviewing related studies. However, because a diversity of studies are included in the review, it is somewhat unclear as to the primary intent of the study. A more focused review on how to implement curricular change or on the change process would bring the needed clarity. Such depth is needed so the reader is more informed about what we already know about the problem and what needs to be learned.

Overall, the research methods and procedures were appropriate. However, it would have been helpful if the authors had provided reliability coefficients for the instrument and the individual sections. Also, the researchers could have provided more information about the selection of the pilot project teachers. Did the teachers already have a strong desire to participate in the project as a result of the agriscience movement in states such as Tennessee and Texas? Were these teachers already teaching agriscience or certain aspects of agriscience? The fact that 41 of the 42 teachers who taught the pilot courses responded to the survey illustrates high interest in the topic. However, one must assume that the authors chose only highly motivated, "good" teachers to participate in the study. Consequently, the reader should ask about the extent to which the findings are positive because of selection biases, statistical regression, novelty, and related factors. Were the teachers especially motivated by the researchers to participate in something new? One encouraging dimension of this question is found in that the only teacher who did not respond was no longer teaching in Mississippi.

Finally, the authors provide a number of conclusions and recommendations. It would be helpful for these to be sorted so the reader can better distinguish between what's being concluded versus recommended. From an implementation perspective, this section could be strengthened with a stronger discussion on what the findings mean and how they will impact upon student learning and enrollments.

Where do we go from here? The major concern about the study relates to the following question. What new knowledge has been learned about agricultural education? The findings tend to support other findings such as those of the Peasley and Henderson (1992) and Budke (1991) studies. However, given the nature of schools and the many forces and factors that impact upon curricular reform, greater depth and insight are needed regarding this problem. As one compares the findings of this study and those of a related study included in this section (Johnson and Newman, 1992), one must question the extent to which the methodology used provides enlightenment relative to the social dynamics, political dimensions, and interactions found in schools? Do we really understand how secondary agricultural education teachers feel about these pilot courses? What types of interactions are needed to get these courses adopted on a broader scale? Focus group interviews and related techniques should be used to provide depth of understanding relative to human behaviors as they exist in a natural setting, i.e. the local school. These and related questions should be addressed if the researchers continue this line of inquiry.

THE RELATIONSHIP BETWEEN THE QUALITY OF THE SUPERVISED AGRICULTURAL EXPERIENCE COMPONENT OF THE SECONDARY AGRICULTURE PROGRAM IN NORTH CAROLINA AND THE INSTRUCTORS' LEVELS OF TIME MANAGEMENT

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INTRODUCTION

Experience plays an important role in properly preparing agriculture students, but without supervision, the experience may do more harm than good. If the practice is incorrect, then the performance is likely to be incorrect (Binkley & Tulloch, 1981). While this may be stating the obvious, this is the model that has been successfully used in agricultural education from its beginning. The basic problem solving teaching model calls for application of material once it has been taught. Through this experiential learning process, students reinforce the material covered and generate new ideas to apply to new situations which lead to new learning. "The value of experiential learning in agricultural education has long been recognized as an important part of the educational process" (Cheek, Arrington, 1990, p. 12).

At the turn of the 20th century, only 3 students out of every 100 stayed in school long enough to graduate (Herren, 1986). The need was seen to provide education that was practical for all young people, including those interested in agriculture. Before 1908, students wishing to study agriculture below the college level were typically sent to dormitory schools which tried to emulate the land-grant colleges. Like most others, these schools provided instruction that was often impractical and boring. It was in 1908 that Rufus Stimson began using the "home-project" or "project method" concept for teaching agriculture at the Smith's Agriculture School in Northampton, Massachusetts. Rather than have students live and work on a school-owned farm, Stimson's plan called for students to live and work on their own farms at home. This provided the opportunity for students to immediately apply concepts learned in class to real-world problems on their own farms (Boone, Doerfert & Elliot, 1987).

"The authors of the National Vocational Education Act of 1917, commonly referred to as the Smith Hughes Act, were undoubtedly influenced by Stimson's work" (Dickerson, 1984, pp. 4-5). The authors of the act recognized the importance of practical instruction and real-world experiences. Phipps & Osborne (1988), quoting the act, wrote "that such schools shall provide for directed practice in agriculture, either on a farm provided for by the school or other farm, for at least six months per year" (p. 550). From the beginning, the acceptance and use of the project method has been a chief contributor to the success of agricultural education (Dickerson, 1984).

For years students learned sound, practical lessons about agriculture through their home projects. Then, a decline was seen in the use of the project method. Moore (1979) pointed out that "the passage of the Vocational Education Act of 1963 signaled the start of the decline of projects. The 1963 act expanded the scope of agriculture to include training for non-farm agricultural occupations . . . . In some states, this was interpreted to mean that projects were still required but they could be off-farm projects as well as on-farm projects. In many states however, the interpretation was 'projects were no longer required'" (p. 219).

The project method has endured as a sound educational system. However, over time subtle changes have occurred which are reflected in the various names that have been used to refer to the project method. These changes generally reflect a broadening of this component of the agricultural education program. However, even with these changes the system has always been based on supervised learning through the student's own efforts and experiences outside the classroom setting. The term Supervised Agricultural Experience (SAE) was used by the researcher in this study in all situations except when using a direct quote containing an older term. For the purposes of this study all terms previously used were considered the same as SAE.

Today SAE may be defined as "all of the agricultural, both occupational and non-occupational, activities of educational value conducted by students outside of the class setting where students apply the knowledge, skills, and attitudes that have been learned in the instructional program and where supervision is provided by parents, employers, teachers, and others" (Cheek & Arrington, 1990, p. 12).

The value of this teaching tool can not be overstated. Morton (1984), feeling that SAE should be considered equal in importance to classroom and laboratory instruction, wrote that "students with lower quality SOE programs are likely to be less prepared for their vocation" (p. 16). SAE also prepares students with experiences that reach beyond mastering technical skills. Morris and Williams (1984) pointed out that "feelings about oneself are important in career development" (p. 54). They went on to conclude that students who received a more programmatic approach to SAE instruction had a higher level of self-esteem than students who received a less programmatic approach to SAE instruction. The importance of SAE has also been recognized by those who are not as directly involved. In the National Academy of Sciences' report Understanding Agriculture: New Directions for Education (1988), while the authors felt SAE may not always be possible, they concluded that "four years of SOE should remain the goal . . ." (p. 41). SAE is a component of the agricultural education program that seems to have stood the test of time. However, in recent years the tide has been obviously shifting, and we are now seeing fewer students involved in any type of SAE (Miller, 1984).

What could cause this decline in SAE when the project method has been given credit for the success of the agricultural education program? Several possible reasons have been offered, one of which is teacher involvement. The authors of the National Academy of Sciences report, Understanding Agriculture: New Directions for Education (1988), listed "involved teachers" as one of the characteristics of high-quality SAE programs. Miller (1980), noted that 42% of North Carolina teachers did not regularly visit students. Without the involvement of the teacher in the planning and supervising of student programs, the quality of the programs will suffer. A report on an Ohio study examining the quality of students' SAE programs showed that the number of SAE visits made to the student was associated with high student SAE scores in terms of scope (Anyadoh & Barrick, 1990). While a high student SAE score is not exactly the same as a high-quality SAE program component, it was assumed that they were an indicator of program quality. Similarly, according to Morton and McCracken (1979) SAE quality can be improved by increasing the amount of attention given by the instructor through project visitation.

Increased demands on instructor time may be contributing to the decline in SAE participation and teacher involvement. Cole (1981) reported average work weeks of between 45 and 65 hours for agricultural education instructors. With the push for more comprehensive agriculture programs, increased student-to-teacher ratios and a high demand on accountability, instructor work-loads have become more time consuming. This increased consumption of instructor time may be contributing to the decline in SAE participation. Foster (1986) reported that "no teacher time assigned for SOE supervision" was a factor of above average importance in limiting SAE participation by students.

Research seems to indicate that improving time management practices could help instructors perform their tasks more quickly. For example, a University of Nebraska at Lincoln (1982) study found that agriculture teachers who participated in time management workshops reduced their time devoted to curriculum planning by one-half. Dillon (1979) stated that "Vocational agriculture teachers who are conducting a full-day school program, complemented with FFA and supervised occupational experience phases, must be efficient managers of time in order to serve all students" (p. 141). He also wrote that teachers had indicated a desire for formal instruction in time management. Better time management can reduce the amount of time required for certain tasks; however, whether an instructor chooses to apply new found time to SAE depends on the priority that the instructor places on SAE.

Experts in time management feel that time management principles can be applied universally, according to a report from The University of Nebraska at Lincoln (1982). The report suggested that time management principles may be applied to any occupation, including education. The report went on to cite Fred Luthans, a business management expert, as recommending that persons familiar with a given occupational area should be the ones to apply the time management principles to that occupation.

A review of the literature yielded several other factors related to time management and quality of SAE. Dillon (1977) found that instructors spend an average of 6% of their working hours on SAE. Blezek (1985) found classroom instruction to have the highest priority in Nebraska, and Dillon (1977), in the same state, found that the task of classroom teaching required the largest amount of instructor time. It is possible that these two variables could have been correlated. Blezek (1986) reported instructors perceiving SAE priority to be 4.25 on a 5.0 point scale. With more students to supervise, the amount of time available for each student is less. Instructors in Lambert's (1986) study listed "large student-teacher ratios" as a factor of above average importance in preventing departments from having SAE programs. No significant difference was found between experienced and first year instructors in terms of time devoted to SAE (Dillon, 1979), however no indication of SAE program component quality was given. Arrington and McCracken's (1983) study provided evidence of a strong relationship between scope of SAE and length of teaching contract. However, Foster (1986) listed "limited number of extended contract days" as a factor not limiting SAE participation. Other factors listed by Foster as not limiting SAE were transportation not provided by the school district and limited mileage budget for on-site instruction. However, informal interviews with teachers revealed a concern about travel time in large school districts.

PURPOSE AND OBJECTIVES

The primary purpose of this study was to determine what relationships existed between the quality of the Supervised Agricultural Experience (SAE) component of the secondary agriculture program in North Carolina and the instructors' levels of time management. In addition to this primary purpose, this study also examined relationships between SAE quality and other variables suggested in the literature that possibly impact on SAE quality. In fulfilling the purpose and objectives of this study, the following research questions will be answered:

1. What is the current status of the quality of the SAE program component in North Carolina, and what is the current level of time management practices used by secondary agricultural education instructors?
2. What is the relationship between the agricultural education instructor's level of time management practices and the quality of the SAE component of the program?
3. What is the relationship between other factors described in the literature and quality of the SAE component of the program?

PROCEDURES

The population for this study consisted of the 327 secondary agricultural education instructors in North Carolina. Names were obtained from an updated copy of the 1991-1992 North Carolina Agricultural Education Directory. Using Krejcie and Morgan's (1970) formula for determining sample size, it was determined that 177 subjects would be included in the sample to obtain a 5% degree of accuracy at a 95% confidence level. The 177 subjects were then selected using a table of random numbers.

The instrument used to collect data in this study contained three major parts. Part 1 of the instrument consisted of a 15 item Likert-type scale to determine the instructors levels of time management practices. The time management scale was validated by a panel of four experts in the field of time management. SAE quality was assessed in Part 2 of the instrument using an adapted version of a scale developed and validated by McCall (1992). This portion of the instrument was used to provide an overall score for the SAE component of the agricultural education program. The third part of the instrument consisted of seven demographic items dealing with selected items found in the literature to be related to SAE quality.

The entire questionnaire was pilot tested for clarity and to determine its reliability using a test-retest procedure. Internal consistency of the time management scale was assessed by calculating a Cronbach's Alpha coefficient of internal consistency (alpha = .75). The SAE quality scale was sent to the instructors twice, at two week intervals using a test-retest procedure, and a coefficient of stability ($r = .87$) was calculated.

Each subject was mailed a packet containing a cover letter, a coded instrument, and a self-addressed return envelope. Twelve days after the initial mailing, those subjects who had not responded were sent a follow-up post card. Those who had still not responded two weeks later were sent a replacement packet. This entire process yielded a total of 127 usable instruments. The total response rate was 71.8%. Of those responding, 78.7% were early respondents and 21.3% were late respondents. Nonresponse error was controlled by comparing (t-test) early and late respondents on the major variables. No statistical differences were found, so the data were assumed to be representative of the sample, and data from all 127 respondents were used in the analyses.

Measures of central tendency, measures of variance, and correlational statistics were used to analyze the data. The practical significance of relationships were determined using Davis (1971) conventions.

RESULTS

Scores on the time management portion could have ranged from a lowest possible score of 15 to a highest possible score of 60. The mean score for the instructor's level of time management practices was 41.84, which was considered to be moderately effective. Almost all instructors at least used a daily to-do list but few used the more advanced time management systems.

Scores on the SAE portion of the questionnaire could have ranged from a lowest possible score of 2.0 to a highest possible score of 86.5. The mean score of the quality of the SAE program component was 39.09, which was moderately poor. From the 93 instruments usable for calculating a quality score for SAE, 10.9% of the scores indicated a poor quality SAE program component, 53.6% were moderately poor, 31.8% were moderately good and 4.4% were good. From this it was seen that 64.5% of instructors have SAE programs that are below the median point of this scale. The majority of instructors (92.6%) are spending some class time teaching students about SAE, reporting 6.34 instructional days devoted to SAE per course. However, only 40.7% allow class time to update record books, while an average of 6.78 opportunities were allowed for this task. Most (81.7%) are spending some of their summer visiting SAE programs, however only 50.8% reported visiting each SAE at least once. Most (60.7%) instructors do not require students to have an SAE and few (60.2%) apply SAE in determining grades. The majority (55.6%) of students do not participate in any type of SAE, and those that do participate can expect, on average, about two visits per year.

Pearson's product moment correlation coefficient was used to determine the relationship between the SAE quality score and the instructor's level of time management score. A correlation coefficient of .20 was calculated, which was not significant at the .05 level and showed no relationship between the variables.

Several other variables were also compared with quality of the SAE program component. It was found that instructors spend an average of 3.21 hours per week on SAE. The amount of time spent on SAE had a statistically significant but low relationship ($r = .26$) with quality of the

SAE program component. On a scale of 1 to 10, with 1 being the lowest and 10 being the highest, instructors rated SAE priority at 5.65 on average. Priority placed on SAE had a moderate relationship ($r = .46$) with quality of the SAE program component and was significant at the .05 level.

The remaining variables: (a) number of students instructed, (b) number of instructors in the program, (c) years of teaching experience, (d) months of instructor employment, (e) miles from the instructor's home to school and (f) miles from the school to the most distant student's home, were not significantly related at the .05 level to the quality of the SAE program component.

TABLE 1

MEAN SCORES, STANDARD DEVIATIONS AND CORRELATION COEFFICIENTS OF RESEARCH VARIABLES WITH QUALITY OF THE SAE PROGRAM COMPONENT

	Mean	SD	r
Quality of the SAE program component	39.09[a]	16.13	
Instructor's level of time management	41.84[b]	4.93	.20
Instructor hours devoted to SAE per week	3.21	3.22	.26*
Priority of SAE with the instructor	5.65[c]	2.58	.46*
Number of students instructed	76.40	20.39	.11
Number of instructors in the program	1.55	0.69	-.07
Years of teaching experience	15.54	9.26	-.09
Months of instructor employment	11.54	0.81	.06
Miles from instructor's home to school	10.95	9.56	.14
Miles from school to most distant student's home	20.57	8.13	.13

*$p < .05$

[a] Maximum SAE quality score possible = 86.5. Minimum SAE quality score possible = 2.0.

[b] Maximum time management score possible = 60. Minimum time management score possible = 15.

[c] SAE priority scale from 1 to 10, with 1 being the lowest and 10 being the highest.

CONCLUSIONS

Based on the findings of this study, the following conclusions were drawn:

1. In terms of the quality of the SAE program component, SAE in North Carolina is in moderately poor condition. While most instructors inform students about SAE, the majority do not require SAE of any kind for all students, and most students are not participating in SAE.
2. Instructors in North Carolina are using some time management practices, but there is room for improvement. Almost all instructors are making at least some effort to manage their

time, but the practices being used may not be sufficient for the demanding time schedules of agricultural education instructors.

3. The quality of the SAE program component in North Carolina should not be expected to improve by increasing the level of time management practices of the instructor as the sole treatment. There seem to be other factors that may be more greatly related to the quality of the SAE program component.
4. Those teachers who place a higher priority on SAE have higher quality SAE programs. This seems to indicate that it is the priority placed on SAE more than the time required that influences the quality of the SAE program component.
5. Those teachers who devote more time to SAE have higher quality SAE programs. For the SAE program component to be of quality, involvement is needed from the instructor in the planning, practice and evaluation of the students' SAE programs.
6. Many of the variables thought to be related to SAE quality (a) number of students instructed, (b) number of instructors in the program, (c) years of teaching experience, (d) months of instructor employment, (e) miles from the instructor's home to school and (f) miles from the school to the most distant student's home, were not found to be related in North Carolina. While this may seem surprising, it seems to indicate that the factors that contribute to the quality of the SAE component may be more in the realm of the teacher's influences than previously thought.

RECOMMENDATIONS

Based on the findings and conclusions of this study, the following recommendations are offered:

1. Instructors may benefit from increased time management practices, but this alone should not be expected to improve the quality of the SAE program component. In-service workshops, pre-service workshops and other courses should be conducted to provide time management instruction for teachers of agriculture. Several agricultural education instructors have received detailed instruction in time management through a time management course taught at North Carolina State University in the Department of Occupational Education. There is a need for more of this type of opportunity for instructors who are using time management practices that may not totally meet their current needs. These courses should focus on the specific time management needs of these teachers rather than providing the more broad and general time management suggestions that are so common.
2. Steps should be taken to increase the priority place on conducting SAE by the instructor relative to other tasks. This has implications for teacher education in preparing future agricultural education instructors, state supervisors in providing in-service for current instructors and professional and student organizations in providing recognition programs for motivation.
3. Longitudinal research should be conducted in the area of SAE to examine the effects of instructor involvement in SAE on the long term career achievement of the student.
4. Additional study should be conducted in the area of quality of the SAE program component to determine what factors contribute to SAE quality. Consideration should be given to studies that use more homogeneous populations. While the results of these studies will be less generalizable, they may provide more useful information in each case.
5. In the area of time management, further study is recommended in similar populations to develop an instrument that assigns weights to various time management practices based upon their relative value in increasing productivity.
6. This research study should be replicated in other states and also in more homogeneous populations to increase the external validity of this study.

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THE RELATIONSHIP BETWEEN THE QUALITY OF THE SUPERVISED AGRICULTURAL EXPERIENCE COMPONENT OF THE SECONDARY AGRICULTURE PROGRAM IN NORTH CAROLINA AND THE INSTRUCTORS' LEVEL OF TIME MANAGEMENT

A Critique

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The researchers predicated their study on the assumption that the quality of students' supervised agricultural experience programs will be influenced by how well secondary agricultural education teachers manage their time. Their literature review was extensive yet somewhat vague about the hypothesized relationship between time management and SAE quality. A stronger conceptual framework would have significantly enhanced the study because time management and quality SAE are treated as two different topics in the review. Stronger integration is needed to move beyond logical argument as a rationale for the study. Even with this limitation, the purpose and objectives were clearly stated.

Overall, the methods and procedures are appropriate for the study. Good attention to detail is evident regarding concepts such as sampling, validity, and reliability. However, the reader is not provided with adequate detail to understand several key variables, i.e. SAE and time management. The authors provide good details about the range of scores for most variables. However, more information is needed to interpret what is intended. For example, the reader must surmise what a teacher must do to be a moderately effective manager of her or his time? In a similar vein, although 127 of the 177 teachers responded, the researchers indicated that only 93 instruments were usable for calculating an SAE quality score. What happened to the others?

The major finding was that there is no relationship between SAE quality and the time management of the teachers. Not surprising, the researchers found that SAE quality is related to how much of a priority SAE is with the teacher and how many hours the teacher devotes to SAE each week. Based upon the literature review, one should have expected such findings. Individuals spend their time on what they deem important. SAE is apparently not a high priority for the teachers included in this study. More discussion is needed about how to change the values and priorities of teachers as a means of impacting upon SAE quality.

As one reviews the conclusions and recommendations, it is apparent that more precision is needed. For example, the authors concluded that, "Instructors in North Carolina are using some time management practices, but there is room for improvement." Based on the objectives, the study sought to determine the relationship between the instructors' level of time management and SAE quality. Similar comments are in order about the recommendations which should be based upon the objectives and supported by the findings. For example, recommendation #5 indicates that, "In the area of time management, further study is recommended in similar populations to develop an instrument that assigns weights to various time management practices based upon their relative value in increasing productivity." Does this infer that better time management will increase the productivity of SAE programs?

Where do we go from here? Most of the conclusions and recommendations are stated with the implicit assumption that SAE should be a higher priority for teachers. If the researchers continue this line of inquiry, they should perhaps begin the study with a different set of assumptions, i.e. How much priority should SAE be given in view of their findings? The researchers, the teachers, and many in the profession apparently place different priorities on the merits of SAE.

STUDENT ACHIEVEMENT, ATTITUDES, AND THINKING SKILL ATTAINMENT IN AN INTEGRATED SCIENCE/AGRICULTURE COURSE

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INTRODUCTION

Recent trends in education as a whole and more specifically secondary agriculture programs, indicate a need to re-evaluate the quality of agricultural instruction available to secondary students. The National Strategic Plan for Agricultural Education has identified seven goals for agricultural education. According to the plan, agricultural education should function as a part of the total educational system and should bring education "about" agriculture to all people in the nation (National Summit on Agricultural Education, 1989).

Zurbrick (1991) defined an agricultural curriculum that serves all students as "comprehensive." A comprehensive curriculum is comprised of separate and distinct curricula taught for different purposes and serving uniquely different clientele. A comprehensive agriculture curriculum would include applied academic courses designed to serve a different student than is currently served by most traditional vocational agriculture programs.

As with agricultural education, there is a need to re-evaluate the quality of science education available to secondary students. American science education serves not to nurture children's natural curiosity but to extinguish it with textbooks of dreary facts and terms (Barret, Cowley, Hager, & Springen, 1990). Science teachers should emphasize the concrete, sensual aspects of science using a "hands-on" method of teaching (Fort, 1990). The hands-on method requires the teacher to be more of a facilitator of learning than a deliverer and director of content (Begley, 1990). The hands-on method makes it possible for students to understand science concepts and processes through their kinesthetic senses, rather than totally through textbooks and lectures (Fort, 1990).

The separate missions of both science and agricultural education could be successfully achieved through a cooperative mission of academic and vocational integration. Applied education can contribute to educational reform by providing students with more opportunities to learn and use basic knowledge in practical situations (Grey, 1991; Grub,1991; Wirt, 1991).

The study of agriculture offers many opportunities to teach hands-on science. By referring to examples from the real world, teachers can capture and hold student interest in science (Budke, 1991). Teachers can emphasize science concepts and principles by bringing an aspect of a living, natural system into the classroom for experimentation and observation (National Research Council, 1988).

The problem addressed by this research was that secondary school students are disinterested in and performing poorly in science. In addition, these students receive little exposure to agriculture and its connections to science. A number of curriculum responses to this problem have been developed and are in the early stages of implementation.

PURPOSE AND OBJECTIVES

The purpose of the study was to compare the effectiveness of an integrated agriculture and science course, Biological Science Applications in Agriculture (BSAA), to that of traditional horticulture courses, as measured by change in student achievement, attitudes, and thinking skill attainment. The specific objectives of the study stated as research questions were as follows:

1. What was the degree of achievement in agriculture for students completing the BSAA course as measured by agriculture unit post-tests?

2. What was the degree of achievement in biological science for students completing the BSAA course as measured by science unit post-tests?

3. What was the degree of achievement in biological science for students in horticulture courses as measured by an end-of-semester achievement test in science?

4. What were the attitudes of students enrolled in the BSAA and horticulture courses toward the fields of agriculture and science?

5. What were the levels of thinking skills attained by students completing the BSAA and horticulture courses?

PROCEDURES

This study was conducted using intact groups. As a result, random assignment of subjects to comparison groups was not possible. For this reason, the use of an experimental research design was not a valid option. As a result, a descriptive comparison based on a simultaneous study of two courses that focus on the plant sciences in agriculture was used as the design of the study. Ten BSAA classes and ten horticulture classes were purposefully selected to participate in the study. As a result of mortality during the course of the semester, comparison group one consisted of 76 students from 6 schools enrolled in the BSAA course and comparison group two consisted of 102 students from 8 schools enrolled in traditional horticulture courses.

Agriculture and science achievement pre-tests were administered to the BSAA group before instruction began. A parallel agriculture and science achievement post-test was administered to the BSAA group at the completion of each instructional unit. A science achievement pre-test was administered to the horticulture group before instruction began and a parallel science achievement post-test was administered after completion of the course. A science and agriculture attitude instrument was administered to both groups before instruction began and a parallel instrument was administered after completion of the course. The Watson-Glasser Critical Thinking Appraisal, Form A, was administered to students in both groups before instruction began and the parallel Watson-Glasser Critical Thinking Appraisal, Form B, was administered after completion of the course. Expert opinion, as well as statistical analyses, determined all instruments used in the study to valid and reliable.

In addition, qualitative data were collected during a visit to each BSAA site to verify that the BSAA course was being correctly implemented. The researcher also visited each traditional horticulture site during the course of the study.

Statistical analyses used to interpret the data descriptively included t-tests, means, frequencies, and percentages.

RESULTS

Research Question 1: Summary statistics for student agricultural achievement by unit of study for the BSAA group are presented in Table 1.

Table 1

Mean Score on Pre- and Post-Agriculture Achievement Test for the BSAA Group by Unit of Study

Unit	Pre-Ag. Achievement			Post-Ag. Achievement		
	n	M	SD	n	M	SD
1	72	42.78	18.40	76	50.00	19.73
2	72	38.75	15.65	72	49.58	18.03
3	72	38.98	17.85	62	56.15	24.72
4	72	35.43	17.76	69	52.71	20.86
5	72	34.78	15.05	30	35.20	16.85
6	72	36.94	18.28	-	-	-
7	72	30.92	16.09	15	43.47	19.12

T-test analysis was conducted to determine if significant differences existed between the mean scores on the pre- and post-agricultural achievement unit tests for the BSAA group. The results of the t-test analysis are presented in Table 2.

Table 2

T-Test for Pre- and Post- Agriculture Achievement Test for the BSAA Group by Unit of Study

Unit	t	df	p
1	3.09	71	.003
2	4.35	67	.0001
3	5.32	59	.0001
4	5.58	64	.0001
5	.61	28	.548
7	1.58	13	.139

The t-tests indicated that the BSAA group achieved a significant agricultural knowledge gain at the .05 level in four out of six units, as measured by the pre- and post-agricultural achievement tests.

Research Question 2: Summary statistics for student biological science achievement by unit of study for the BSAA group are presented in Table 3.

Table 3

Mean Score on Pre- and Post-Biological Science Achievement Test for the BSAA Group by Unit of Study

Unit	Pre-Science Achievement			Post-Science Achievement		
	n	M	SD	n	M	SD
1	73	51.37	20.02	76	61.18	19.86
2	73	43.00	17.30	72	58.19	20.58
3	73	43.60	18.54	63	58.97	20.60
4	73	38.86	18.13	69	52.70	20.86
5	73	34.69	12.77	30	38.93	16.85
6	73	31.23	18.25	-	-	-
7	73	32.6	16.9	15	44.73	19.02

T-test analysis was conducted to determine if significant differences existed between the mean scores on the pre- and post-biological science achievement unit tests for the BSAA group. The results of the t-test analysis are presented in Table 4.

Table 4

T-Test for Pre- and Post- Biological Science Achievement Test for the BSAA Group by Unit of Study

Unit	t	df	p
1	3.87	72	.0001
2	5.64	68	.0001
3	6.35	59	.001
4	9.67	64	.001
5	3.07	28	.005
7	.34	13	.740

The *t*-tests indicated that the BSAA group achieved a significant biological science knowledge gain at the .05 level in five out of six units as measured by the pre- and post-biological science achievement tests.

Research Question 3: Summary statistics for student biological science achievement for the horticulture group are presented in Table 5.

Table 5

Mean Score on Pre- and Post-Biological Science Achievement Test for the Horticulture Group

Test	*n*	*M*	*SD*
Pre-Biological Science	92	41.48	12.79
Post-Biological Science	93	42.08	15.11

T-test analysis was conducted to determine if significant differences existed between the mean scores on the pre- and post-biological science achievement tests for the horticulture group. The results of the *t*-test analysis are presented in Table 6.

Table 6

T-Test for Pre- and Post- Biological Science Achievement Test for the Horticulture Group

Test	*t*	*df*	*p*
Biological Science Achievement	.40	83	.689

The *t*-test indicated that mean scores on the pre- and post-biological science achievement tests for the horticulture group did not differ significantly at the .05 level (p=.689).

Research Question 4: *T*-test analysis was conducted to determine if significant differences existed between the mean scores on pre- and post-attitude toward agriculture and science for students in the BSAA and horticulture groups. The *t*-test indicated that mean scores on the pretest and posttest measuring attitude toward agriculture and science for the BSAA group were not significantly different at the .05 level (p = .147 and .77, respectively). The *t*-test indicated that mean scores on the pretest and posttest measuring attitude toward agriculture and science for the horticulture group were not significantly different at the .05 level (p = .473 and .313, respectively).

Research Question 5: *T*-tests were performed to compare the BSAA and horticulture groups with respect to student thinking skill gain. The *t*-test indicated that mean scores for thinking skill gain for the two groups did not differ significantly at the .05 level (p = .884).

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions were drawn, based upon the findings of this study:

1. BSAA is effective in advancing student knowledge in agriculture and biological science. In this study, BSAA students exhibited significant gain in agricultural knowledge in four out of six instructional units and a significant gain in biological science knowledge in five out of six instructional units.
2. The horticulture courses included in this study did not significantly contribute toward science achievement.
3. Neither BSAA nor horticulture courses significantly contribute to a change in student attitude toward science or agriculture.
4. Neither BSAA nor horticulture courses significantly contribute to a change in student composite thinking skill levels.

Based on the findings and conclusions of this study, the following recommendations were offered.

1. Wider implementation of the BSAA course should be pursued until it is included in the curriculum of all high school agriculture programs in Illinois.
2. In order to reduce the variation which exists in the level of teacher effectiveness, agriculture instructors, as well as students enrolled in teacher education programs, should receive instruction in the methods and procedures of managing scientific and inquiry-based laboratory instruction. Areas of instruction should include: (a) science content present in the BSAA course, (b) specific laboratory management techniques, (c) techniques for time management, (d) handling student discipline in the laboratory, (e) expected student outcomes or objectives.
3. Additional planning time should be scheduled into the school day so that teachers may more thoroughly prepare for daily laboratory and instructional activities.
4. Given student attitudes toward the BSAA course, and apparent gains in science and agriculture, more courses of this type should be developed and implemented.
5. Due to teachers lack of science knowledge, and lack of planning time to collect and review reference materials, subject matter supplements should be included in the teachers manual.
6. Studies of similar purpose, which utilize random selection of subjects and assignment of treatments, should be conducted in order that the results may be generalized to the target population under study.

DISCUSSION

During the course of the study it was determined that the results of the study may have been affected by several factors which were not controlled for by design. Because samples were not randomly selected and treatments randomly assigned, the results of the study are valid and reliable for the two comparison groups utilized in the study only and are in no way generalizable to the population.

Teachers in both comparison groups raised concerns during the course of the study that some students may not have been performing to the best of their ability on the testing instruments. It was determined that this could have occurred for several reasons. Lack of motivation was a factor in certain students' reluctance to perform to the best of their ability on the test instruments. In addition, because the researcher utilized a number of instruments to gather data on the dependent variables, students may have been over-tested.

From direct observation of BSAA instruction, it was determined that a great deal of variation existed in the quality of teacher instruction and student performance. In addition, it was observed that student groups who received higher quality laboratory instruction achieved a higher level of laboratory participation and performance than did student groups who received lower quality instruction.

The researchers observed certain commonalties in classrooms where higher levels of student participation and performance were present. They were as follows:

1. The BSAA instructor conducted a pre-laboratory discussion on order to determine the objective of the class and procedures to be followed during the laboratory activity.

2. The research question to be answered was presented to the student group and discussed before beginning the laboratory activity.

3. Laboratory stations were properly equipped and organized.

4. Students performed laboratory activities in small groups, rotating between new and ongoing laboratory activities.

5. Laboratory techniques such as data collection and data presentation were stressed by the instructor.

6. The instructor rotated among groups, guiding and directing individual investigations, posing questions, and providing feedback.

The researchers observed certain commonalties in classrooms where lower levels of student participation and performance were present. They were as follows:

1. No pre-laboratory discussion was conducted in order to determine the objective of the class, procedures to be followed, or question to be answered.

2. Laboratory activity was conducted as a class activity with most of the students in the group participating only as observers.

3. A higher percentage of "traditional" lecture-discussion instruction was present during the class session.

4. The implied purpose of the laboratory activity was to demonstrate a principle rather than to answer a question.

If colleges and universities are to accept science courses in agriculture as part of the entrance requirement in science, steps must be taken to insure that students enrolled in such courses receive science instruction at least equal to that which they would normally receive from traditional science courses. In order for students to receive quality science instruction from an agriculture course taught by an agriculture instructor, a systematic statewide effort must be made to develop scientifically literate secondary agriculture instructors who are competent in inquiry learning techniques in science. Modifications in our programs do not occur automatically, they must be initiated, they must be guided, and they must be given ample time to fully occur. In order to maintain these modifications in our programs, the results of such change must determined and positively presented. Certain steps must occur if a success state-wide implementation of BSAA is to exist. They are as follows:

1. Science teachers must feel such change is needed and work cooperatively with agriculture teachers using BSAA.

2. Agriculture teachers must also feel such change is needed and accept responsibility for initiating it. Agriculture teachers must become literate in science if they are to utilize laboratory activities which connect science concepts to agriculture applications.

3. Agriculture and science teachers must work closely, utilizing each others expertise, equipment, and facilities in order to aid in successful implementation of BSAA.

4. Most importantly, administrators must realize, promote, and support the need for the implementation of BSAA.

5. Local, state, and national educational leaders must promote and support the concept. Educational policy should be developed to provide funding incentive for such change to occur.

6. Students pursuing degrees in agricultural education should receive instruction related to the integration of science concepts into the agriculture curriculum.

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STUDENT ACHIEVEMENT, ATTITUDES, AND THINKING SKILL ATTAINMENT IN AN INTEGRATED SCIENCE/AGRICULTURE COURSE

A Critique

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I commend the authors for researching an area attracting a lot of attention in schools and in agricultural education programs. More emphasis has been placed on the "science" aspects of agriculture in recent years and one can anticipate this trend will grow even more in the future. The profession needs sound a research base on integrating science and agriculture to guide program decisions.

The researchers provided an informative review of literature and established a sound framework for conducting the study. Limitations of the study prevented in-depth comparison and the researchers were careful to limit generalizations to the groups included in the study. The objectives were stated in the form of research questions. The research questions were concisely addressed and the results, conclusions, and recommendations were reported in a systematic manner which permitted the reader to easily read and interpret the article.

The investigators raised several concerns in the discussion section of the paper which to this reader indicated that those concerns were felt to have impacted the results. In fact much of the discussion seemed to focus on their observations rather than the direct results reported. I commend the researchers for such acknowledgements because these can help future researchers avoid or at least reduce similar problems. Also, the investigators used their observations to identify commonalities for both high and low levels of student participation and performance which can provide a checklist for future studies.

Several questions impacting the usefulness of the study can and should be posed and addressed. First, the results are only as good as the instruments used in the process. The researchers indicated assessment of both validity and reliability; however, reliability figures were not provided nor was explanation of validity determination. What reliability coefficients were attained? What procedures were followed in establishing the validity of the instruments?

Second, why were the post-tests administered following each unit for the BSAA classes, while a single post-test was administered to the horticulture classes? It seems logical that immediate evaluation and assessment might yield higher scores than delayed evaluation. By evaluating each unit, the content would seem to be on the students' minds more than if they needed to recall the materials at the end of the course. What happened to the post-test on BSAA unit 6? Also, why were the horticulture students evaluated on science achievement but not agriculture achievement? Were the same biological science achievement tests administered to both groups?

Third, since the researchers established in the introduction that "secondary school students are disinterested in and performing poorly in science", how does the attitude measurements contribute to the literature? The investigators found no significant difference in students' attitude or thinking skills as a result of taking either horticulture or BSAA. What does this mean? It would seem appropriate for the researchers to address these issues more than simply stating they found no significant change.

Again, I want to commend the researchers for addressing questions related to of the effectiveness of teaching science in agricultural programs.

THE RELATIONSHIP OF SCHOOL LOCATION AND STUDENT ACHIEVEMENT IN OHIO PUBLIC SCHOOLS

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INTRODUCTION

Research on school effectiveness has suggested that rural and smaller sized schools often are some of the most effective ones (Howley, 1989 & Goodlad, 1984). The literature also suggests that rural and smaller school districts extend more financial effort relative to financial ability than do larger school districts (Howley, 1989). Currently, there is an emphasis on outcomes and accountability regarding public school policy (U. S. Dept. of Labor, 1991). The national rhetoric related to pubic schools increasingly emphasizes the notion of "doing more with less". In order for policy makers to make informed decisions about public school resources and outcomes, there should be a systematic attempt made to examine specific relationships and effects of school size and location upon schooling outcomes.

Agricultural education has always served rural communities (True, 1929). Although agricultural education has, in recent years, sought to provide relevant education for a more diverse range of communities, agricultural education programs still exist in rural communities. In Ohio, Baker (1990) found that the vast majority of rural school districts had agricultural education programs. It is important for the discipline of agricultural education, then, to participate in inquiry which informs the policy debate regarding rural schools.

Stephens (1992) outlined several political trends that are affecting rural schools in the United States. The first of these trends is the reduction of the federal government's role since 1980, which has resulted in the reduction of federal revenue sharing for state and local governments. Also, there is a continuing increase in the concentration of population around metropolitan areas (U. S. Bureau of Census, 1991), which has led to a dramatic shift in the alignment of political power, both at the state and federal levels. In turn, the fiscal pressures upon local rural governments have increased. Rural governments have had to bear more of the financial burden of maintaining their infrastructure. Correspondingly, rural school districts are facing increasing competition for local tax revenues.

The result of these demographic and political changes is that rural areas are facing increasing financial responsibility for their schools, roads, and municipal services (Baker, 1990 & Harl, 1985). Rural areas are going to be negatively affected in terms of their ability to provide for adequate public education (Stephens, 1992). Bass and Verstagen (1992) conducted a national survey of state educational funding policies and found vast differences in the way that states equalize for factors related to a school's geography and enrollment level. It is imperative that scholarship regarding school location, size, and effectiveness be conducted so that educational policy makers can make informed decisions about resource allocation and outcomes.

Coleman (1966), in one of the classic studies of school effectiveness, found that socioeconomic status was the most powerful predictor of student achievement. Studies related to school size and school effectiveness have indicated that smaller schools are often more effective than larger schools in terms of student achievement (Walberg & Fowler, 1987). In their analysis, Walberg and Fowler attempted to determine differences in school efficiency among different sized schools by controlling for socioeconomic status. Howley (1989) showed that rural schools are often much more effective in terms of student achievement than are metropolitan schools, especially when mitigating factors such as socioeconomic status and school expenditure were controlled. Any quantitative study of school outcomes must therefore seek to control for differences in school district wealth.

Research in Ohio has studied rural schools in terms of student aspirations (McCracken, Wims, & Barcinas, 1991; McCracken & Odell, 1989), voter behavior (Baker, 1990), curriculum (Elliot & McCracken, 1989), achievement (Peasley, Baker, & McCracken, 1991; Baker, 1990); and school expenditure patterns (Peasley, Baker, & McCracken, 1991). Peasley, Baker, and McCracken (1991) found that expenditure was unrelated to student achievement when controlling for socioeconomic factors. Subsequently, they recommended that research should be conducted to examine the relationship of school location and achievement.

PURPOSE AND OBJECTIVES

The purpose of this study was to determine the relationship of school location and student achievement in Ohio public school districts. The following research objectives were developed to guide the study:

1. To describe Ohio school districts in terms of financial ability, financial effort, and student achievement according to school location (rural, semi-rural, rural/suburban, suburban, and urban).
2. To determine the relationship of school location and student achievement in Ohio school districts after controlling for other important independent variables.

PROCEDURES

The study was ex-post facto/correlational. A census of all school districts in Ohio (N=612) was conducted using data from the years 1988-90. Data were collected from records compiled by the Ohio Departments of Education and Taxation in April, 1991. The independent variable for this study was school location (rural, semi-rural, rural/suburban, suburban, and urban). Other possible independent variables identified through a review of the relevant literature included:

A) Measures of school district financial ability--average and median family income,the percentage of families receiving aid to dependent children (ADC), the number of students receiving free and reduced lunch, total property valuation/pupil, and agricultural and residential property valuation/pupil.

B) Measures of school district financial effort--agricultural and residential property tax rate, current school operating expenditures tax rate, total property taxes/pupil, % of total district funding from local revenues, total expenditure/pupil, average teacher salary, instructional expenditure/pupil, and non-instructional expenditure/pupil.

C) School size as measured by total average daily membership of students enrolled in a district.

The criterion variable for this study was a measure of student achievement, the Ohio proficiency examination. High school students in Ohio are required to pass a proficiency examination on basic reading, writing, mathematics, and citizenship skills in order to receive a diploma. This criterion-referenced test went through an extensive validation and field testing procedure by Department of Education testing consultants. Pilot test reliability estimates ranged from .85-.89 on the four scales (Ohio Dept. of Education, 1991). The percentage of high school students in each district who passed the test in the fall of 1990 was used as the indicator of student achievement for this study.

Schools were classified into one of five location categories based upon 1990 U. S. Census data as follows: **rural** schools (N=69) were those schools located in counties that had a population less than 40,000 and were not contiguous to a Metropolitan Statistical Area (MSA); **semi-rural** (N=101) schools were located in counties with a population greater than 40,000 and were not contiguous to a MSA; **rural/suburban** schools (N=45) were located in counties with a population less than 40,000 and were contiguous to a MSA; **suburban** (N=185) schools were located in counties with a population greater than 40,000 and were contiguous to a MSA; and **urban** schools (N=202) were located in counties classified as a MSA.

ANALYSIS OF DATA

School districts served as the unit of analysis for this study. Descriptive statistics were used to analyze data relative to the first objective. Correlational and regression analysis was used to analyzed data in order to address the second objective. Originally, a total of sixteen measures were collected and identified as potential extraneous variables. Of these, seven were found to be correlated with both the criterion variable and the main independent variable (Location). These seven measures were included in the regression analysis. Since a census of all Ohio school districts was taken, the statement of an alpha level was not necessary. Results of the analyses performed are true for the population of Ohio public school districts.

RESULTS

Objective 1: There exist several practically significant differences regarding school district financial ability, financial effort, and student achievement between classes of school location in Ohio public school districts. These data are summarized in Table 1. In terms of financial ability, average median family income ranged from $19,839 (S. D.=$2,405) for rural districts to $24,259 (S. D.=$2,980) for urban districts. The median percentage of families receiving ADC was for rural and semi-rural schools was more than double that of rural/suburban, suburban, and urban districts. It appears that rural and semi-rural schools have significantly lower financial ability than do suburban and urban districts.

School districts also differed widely in their financial effort. Urban districts raised nearly twice the amount of property taxes on a per-pupil basis (median=$2,075) than do

Table 1

Means, Standard Deviations, and Medians of Selected Measures of Financial Effort, Financial Ability, and Student Achievement of Ohio Public School Districts By School Location, 1990 (N=612).

Measure	Rural N=69	Semi-Rural N=101	Rural/ Suburban N=45	Suburban N=185	Urban N=202
Finan. Ability					
Income Mean	$19,839	$20,569	$21,459	$22,323	$24,259
S.D.	$2,405	$2,519	$1,982	$3,373	$4,980
Median	$19,327	$20,337	$21,419	$21,697	$23,405
%ADC Mean	12.96	13.84	5.08	7.21	8.75
S. D.	8.59	9.92	3.47	5.48	10.49
Median	10.00	12.00	5.00	5.00	4.00
Finan. Effort					
COpMil Mean	31.71	33.36	34.07	40.52	44.83
S. D.	7.54	5.60	6.71	8.61	11.21
Median	30	33	32	39	42
TaxPup Mean	$1,168	$1,342	$1,376	$1,975	$2,584
S. D.	$454	$587	$462	$2,727	$1,513
Median	$1,067	$1,270	$1,269	$1,527	$2,075
%Local Mean	35.11	38.96	41.25	45.32	54.71
S. D.	11.27	14.92	10.42	14.45	17.83
Median	33	37	39	43	51
TeSal Mean	$26,031	$26,939	$26,266	$28,181	$31,510
S. D.	$1,755	$2,029	$2,259	$2,924	$3,366
Median	$26,214	$27,021	$25,799	$27,985	$31,448
NIExPu Mean	$59	$59	$70	$68	$82
S. D.	$34	$33	$48	$43	$59
Median	$56	$55	$64	$62	$66
Student Achievement					
PPass Mean	29.2	31.9	42.0	36.7	40.4
S. D.	10.3	11.0	16.0	11.8	15.9
Median	29	32	45	35	40.5

Note: Income=median family income; %ADC=percentage of families in district receiving ADC; COpMil=current operating millage rate; TaxPup=per-pupil property taxes; %Local=percentage of total school district budget funded from local sources; TeSal=average teacher salary; NIExPu=per-pupil non-instructional expenditure; PPass=percentage of students in district passing the state proficiency examination.

rural districts (median=$1,067). There are also large differences between school districts in terms of operating expenditure tax rates, teacher salary, and the percentage of total expenditure raised from local revenue sources (median percentages were below 40% for rural, semi-rural. and rural/suburban districts versus 51% for urban districts). In general, the trend in district financial effort follows that of financial ability. Urban and suburban districts appear to have greater financial ability and also expend more financial effort in raising funds for public schools.

Rural/suburban schools had the highest student achievement, followed by urban, suburban, semi-rural, and finally rural schools. It is important to note that rural/suburban schools and urban schools also had the highest variances (S. Ds.=16.0 and 15.9, respectively) in student achievement. Student achievement in Ohio schools does not follow the same trend that financial ability and effort do (e.g., that financial ability and effort appear to increase as population density increases).

Objective 2: Bivariate relationships of financial ability and effort to both school location and student achievement are presented in Table 2. The two measures of financial ability and five measures of financial effort were selected from the original list of sixteen measures. All measures selected had minimum correlation coefficients of .20 with both student achievement and location.

Table 2.
Intercorrelations of School District Characteristics Determined to Be Related to Both Student Achievement and School Location (N=612).

Characteristic	1.	2.	3.	4.	5.	6.	7.	8.	9.
1.PPass	--	.30[a]	.59	-.61	.30	.32	.47	.31	.41
2.Location		--	.39[a]	.31[a]	.29[a]	.60[a]	.42[a]	.49[a]	.21[a]
3.Income			--	-.58	.34	.48	.55	.49	.37
4.%ADC				--	-.22	-.07	-.42	-.21	-.29
5.TaxPup					--	.48	.66	.31	.39
6.TSal						--	.61	.54	.39
7.%Local							--	.43	.44
8.COpMil								--	.31
9.NIExpPu									--

[a]--denotes Multiple Correlation Coefficient calculated by dummy-coding of school location.

A semi-partial regression analysis was used to calculate the unique relationships between the variable sets school location, financial ability, and financial effort. Results of the analysis are presented in Table 3. School district financial ability explained the greatest amount of unique variance in student achievement ($sR^2=.205$), followed by district financial effort ($sR^2=.043$). School location accounted for a minimal ($sR^2=.011$) amount of the unique variance in student achievement. The percentage of families receiving ADC ($\beta=-.41$) and median family income ($\beta=.22$) were the strongest individual predictors of student achievement.

Table 3
Semi-Partial Regression Analysis of Student Achievement on District Financial Ability, Financial Effort, and Location of Ohio Public Schools, 1990 (N=612).

Variable Set	K_a	K_b	sR^2	β
Ability	2	9	.205	
Income				.22
%ADC				-.41
Effort	5	6	.043	
TaxPu				-.02
TSal				.16
%Local				.03
COpMil				-.00
NIExPu				.16
Location[a]	4	7	.011	.00-.12[b]

K_a=Number of variables in set; K_b=Number of variables controlled.
R^2 for Model=.508.
[a]-Location is dummy coded into a four variable set for this analysis.
[b]-Represents the range of Beta values for the four dummy-coded variables.

CONCLUSIONS AND RECOMMENDATIONS

There are differences in every measure of financial ability among school districts based upon school location in Ohio. Urban and suburban districts have a greater capacity to generate revenue for local schooling than do rural, semi-rural, and rural/suburban districts. Urban and suburban schools also expend more financial effort to support schools than do rural, semi-rural, and rural/suburban schools. Generally, urban and suburban schools in Ohio have more per-pupil wealth and spend more money on a per-pupil basis than do rural, semi-rural, and rural/suburban schools. These findings support the contention of Stephens (1992) that rural schools are at a distinct fiscal disadvantage. As long as significant differences exist in economic wealth between school districts, fiscally poor communities will continue to hard pressed to fund schooling as well as those districts which are wealthier.

Leaders of Ohio rural school districts should continue to examine innovative ways of maximizing the funds that can be raised for public schooling to guarantee the most efficient use of scarce resources. Ohio rural school leaders should also maintain an active voice in the state-wide educational policy making process. Rural school researchers should continue to research patterns of expenditure and taxation in Ohio public schools within classes of school location, in an effort to identify differences in how school districts spend funds. Legal redress of educational funding inequities may be necessary.

Ohio agricultural education teachers are often responsible for planning educational programs in their schools. These teachers need a high level of awareness of the fiscal realities of their school district. These findings, as well as other research and policy studies of rural schools should be included in the program planning component of the teacher education curriculum of Ohio agricultural educators.

Rural/suburban schools have the highest level of achievement among Ohio schools. Rural schools and semi-rural schools lag behind rural/suburban, suburban, and urban schools in terms of student achievement. The meaning of this finding is unclear, and may be better understood as more data on student achievement are generated. An examination of the trends in student achievement between classes of school location should be conducted in order to better examine this phenomena.

The use of one measure of student achievement as an indicator of effective schools is problematic. Research should be conducted in Ohio public schools to identify alternative indicators of school effectiveness.

The results of this study confirms Coleman's (1966) finding that socioeconomic status is the strongest predictor of student achievement. In Ohio, school location is unrelated to student achievement when the financial ability and effort are controlled. This may be due in large part to the differences in financial ability and effort among classes in school location. Research should be conducted to examine these differences in greater detail, both between and within classes of school location. Further research also is warranted in order to discover how funds might be more effectively used to improve student achievement.

Finally, this study is limited by the quantitative nature of the analysis. The data that were analyzed are only one way of examining the relationship of school location and achievement. Additional qualitative studies should be conducted to examine the differences in the schooling experience among classes of school location in greater depth and breadth. Results from this naturalistic inquiry would add further information for those involved in the educational policy-making debate.

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THE RELATIONSHIP OF SCHOOL LOCATION AND STUDENT ACHIEVEMENT IN OHIO PUBLIC SCHOOLS

A Critique

Richard I. Carter, Iowa State University--Discussant

I commend the authors for providing a concise, informative manuscript of research that impacts agricultural education programs across the country. The demographics of rural areas, combined with political implications related to governmental policies, have contributed to problems confronting rural America including education. Much attention in agricultural education has recently been directed at meeting the needs of non-traditional students in urban and suburban areas while the rural students have been forgotten. This study attempts through a well-designed study to analyze the relationship of school location and achievement.

The investigators provided an excellent review of literature establishing the need for the study and building on research that has been conducted. The objectives were clearly identified and addressed in the manuscript. Procedures utilized by the researchers were appropriate and comprehensive. The researchers made the reader aware of how the results could be generalized and utilized. Preliminary analysis of measures enabled the researchers to reduce the list of measures and to focus on those seven measures most closely associated with student achievement and the primary independent variable, school location.

Results were presented in a straightforward manner with the investigators expounding on the key results. The researchers reported the results of individual measures and lead to overall conclusions. Conclusions and recommendations were consistent with the results reported and in several cases the researchers linked the findings with previous research. The researchers identified two of the key limitations of the study and proposed further techniques to address them.

Several questions impacting the usefulness of this study can and should be posed and addressed. First, what does the score on the student achievement measure mean? Does it mean that at best only 42 percent of the students in Ohio get a diploma? Was the requirement in place in 1990 or was the 1990 scores used a preliminary evaluation to give schools an idea of how their students could perform? These questions and others raise red flags as to the usefulness of the state proficiency examination as a measure of student achievement.

Second, the authors pointed out that the findings confirmed the relationship between socioeconomic status and student achievement. What specific measures did the investigators use to support this statement? Specifically, what did the researchers include in describing the socioeconomic status? For example, was the percentage of individuals receiving ADC included in socioeconomic status? Can relationships also be drawn from the data that establish a relationship between school location and socioeconomic status?

In summary, I would like to commend the researchers for addressing a critical problem in a very scientific manner.

THE AFFECT OF LEARNING STYLE ON ACADEMIC ACHIEVEMENT AND PERCEPTIONS OF TWO METHODS OF INSTRUCTION

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INTRODUCTION

A wealth of research has been undertaken to attempt to define and demonstrate the affects of a student's learning style on academic performance in the classroom. Cognitive style is not a single entity. Researchers examining learning styles have varied views on the exact components and characteristics of learning styles. Keefe (1982) stated,

> Learning styles are cognitive, affective, and physiological traits that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment. (p. 32)

The most accepted learning styles range from the Conceptual Tempo (Kagan et al., 1964) and Hemisphercity (Bjorklund, 1989) approaches to the Convergent/Divergent thinking (Guilford, 1959) and Independent/Dependent (Witkin, Moores, Goodenough, & Cox, 1977) techniques.

According to Rasinski (1983), field independence/dependence is "by far" the most researched of all cognitive styles. This learning approach measures how much students are able to overcome the effects of distracting background elements when they attempt to differentiate relevant aspects of a particular situation (Dembo, 1991). Witkin et al. (1977) stated that field independent students show greater interest in more impersonal, abstract aspects of various stimuli. Contrastly, field dependent students, prefer a higher level of social sensitivity and prefer structured activities that require involvement with others.

Dembo (1991) stated the following about field dependent versus field independent students and how they interact differently with their environment,

> Field dependent persons are drawn to people, favor occupations, such as teaching, that require involvement with others, and prefer academic areas, such as the social sciences, that are more people oriented. Field independent persons favor school subjects such as mathematics and the physical sciences, that stress the impersonal and abstract. Field dependent persons are better at learning and remembering social material, and field independent persons are better at learning and remembering impersonal material. (p. 83)

Independent and dependent learning style has an impact with respect to academic achievement in classrooms that use computer aided instruction. Cheney (1980) suggested that computer aided instruction can be made more effective if it is adapted to an individual's cognitive style. Post (1987) found similar results in his computer based research. MacGregor, Shapiro, and Niemiec (1988) in researching the effect of computer aided mathematical instruction, found that although field independent students outperformed field dependent students in all teaching methods, field dependent students particularly benefited from computer aided instruction as it provided the needed cognitive structure and consistency that they lack.

A continual dilemma experienced by agricultural educators is how to respond to the changing face of society and stay abreast of the possible impacts that technology could have in the teaching-learning context. A relatively new dimension of microcomputer technology entitled, "multimedia" possesses the potential to influence student learning and knowledge acquisition. Multimedia is a multi-faceted approach to computer-based education that brings together text, graphics, animation, video, still images, audio, and motion video.

Sensing the vast capabilities of multimedia in the educational realm, computer companies have developed multimedia software packages that can be used as teaching tools by instructors. Multimedia serves as a trenchant teaching tool since it facilitates more complete use of a student's senses in learning. Multimedia instructional material allows the learner to actually see, hear, and use the content learned (Roden, 1991). Because multimedia software and hardware furnishes students with these experiences, it has the potential to be applied in a variety of educational settings.

While a few studies have addressed the impact of computer multimedia on student achievement, none have been undertaken to determine the affect that learning style has on student performance when utilizing multimedia instruction. If agricultural educators can adapt and utilize multimedia technology as a new teaching tool, capable of improving every students' ability to learn, then certainly all individuals involved in agricultural education will benefit.

Purpose and Objectives

The major purpose of this research study was to compare the extent to which academic achievement and students' perceptions of traditional lecture and computer multimedia instruction are affected by learning style. Specific objectives for this study were to determine: 1) the extent to which academic achievement is affected by learning style; 2) the affect of learning style on student perceptions of the computer multimedia module; and 3) the affect of learning style on student perceptions of lecture instruction.

PROCEDURES

Methodology, Population, and Sample: This study was planned and conducted in conjunction with a larger study on the affects of computer multimedia education. The researchers utilized a pretest-posttest control group experimental design. Participants in this study were undergraduate students (n=75) at Purdue University enrolled in Agricultural Economics 100 during spring semester, 1992. Agricultural Economics 100 is the introductory agricultural economics course. Students were randomly assigned to one of three experimental groups: multimedia instruction only, lecture instruction with multimedia as a supplemental learning tool, and lecture only. Students in these groups were then classified as either field dependent of field independent using the Group Embedded Figures Test (G.E.F.T.). This test gauges the students' learning style by having them locate a previously seen simple figure within a larger complex figure which is organized such that the simple figure is embedded.

Instrumentation: Instruments were developed to measure the dependent variables and to record perception, personal, and situational data. Data was collected using a demographic questionnaire, agricultural economics demand knowledge test, Multimedia Perception Questionnaire, Lecture Perception Questionnaire, and the G.E.F.T. test. Reliability coefficients were calculated for the three achievement tests and the perception questionnaires. The achievement test instruments produced reliability coefficients of .63 for the pretest, .66 for the short-term posttest, and .68 for the delayed posttest. Coefficient Alpha of .93 and .49 were computed for the multimedia and lecture perception questionnaires, respectively. Reliability for the G.E.F.T. has been determined to be .82.

The computer multimedia module on demand concepts was developed by the researcher. Instructional content included in this module was: definition of demand, marginal utility, factors that shift demand, and factors that change quantity demanded. Content validity of the program was evaluated by experts in the field of agricultural economics and agricultural education. The multimedia package was pilot tested on selected School of Agriculture students who completed the Agricultural Economics 100 course.

Administration: Prior to the pretest, the students were randomly assigned to a multimedia only group (Group I), a lecture group with multimedia supplementation (Group II), or the lecture control group (Group III) using the students' identification numbers and a table of random numbers. All students took the agricultural economics demand knowledge pretest and completed the demographic questionnaire during the class period preceding the first treatment.

All students then received instruction on the selected topic, "Demand Principles". The experimental group (Group I) did not attend the traditional class on this topic; rather they were asked to work with the computer multimedia instructional packet. The students had up to 50 minutes to work with the multimedia program. Instructional time spent on the demand module for each student was kept both manually and through tracking procedures within the multimedia module. Upon completion of the computer multimedia instructional module, the students filled out a questionnaire to determine their perceptions of the computer multimedia module. The students in Group II attended the traditional lecture with the control group (Group III). The lesson on demand concepts was 50 minutes long and was taught in the regular classroom by the agricultural economics professor.

One week after the completion of the instructional unit, all students were given the agricultural economics short-term demand knowledge posttest. The students in Group II and III also completed the Lecture Perception Questionnaire at this time. Group II, the traditional group that used multimedia as a supplement learning tool, was then given a set of written instructions and had one week in which to work with the multimedia module in the computer center and complete the Multimedia Perception Questionnaire. The delayed demand knowledge posttest was given to all students 3 weeks following the instructional unit.

All students were given the G.E.F.T. instrument 30 days following the delayed posttest. Since this is a psychological test that can be given at any time, the researchers gave the test during a time which was convenient to the schedule of the Agricultural Economics 100 class. The length of this study was 23 days from the initial pretest to the delayed posttest and 53 days from pretest to the G.E.F.T.

ANALYSIS OF DATA

The data collected from this experiment were checked, coded, and entered into data files on the main frame computer and were analyzed using the Statistical Package for the Social Sciences (SPSSx). Only completed data from students taking the pretest, short-term posttest, long-term posttest, perception questionnaires, and the G.E.F.T. were used in the analyses.

Dependent variable gathering instruments, including the pretest, posttests, and perception questionnaires were analyzed for reliability. Cronbach's Coefficient Alpha was used to estimate the reliability for this analysis. Descriptive statistics, analysis of variance, multifactor analysis of variance, and inferential statistics were used to determine differences between treatment groups and pretest and posttest scores. Questions on the perception questionnaires designed to elicit negative responses were recoded for data analysis purposes to provide uniform responses for calculation of individual and group means. Descriptive statistics and analysis of variance were used to analyze data on the perception questionnaires and to gauge differences between learning styles.

RESULTS

Description of Sample: Only completed data from students taking the pretest, short-term posttest, long-term posttest, perception questionnaires, and the G.E.F.T. were used in the analyses. Thus, the sample size decreased to 53 students. Available SAT, pretest, posttest, and G.E.F.T. scores of the students dropped from the study were analyzed and were determined not to be significantly different from those included in the sample group. For this study, a majority of the student population (62.3%) was white male. No members of the sample group or population were minority students.

All students were enrolled in the School of Agriculture. Agricultural Economics and Agricultural Education majors, respectively, made up 42 and 21 percent of this group. Using the G.E.F.T. instrument, 23 (43.4%) students were classified as field dependent learners and 30 (56.6%) were classified as field independent learners. The breakdown of learning style by treatment group can be viewed in Table 1.

Table 1

Distribution of Students by Learning Style

Group	Independent	Dependent
Group I (n=15)	9	6
Group II (n=22)	13	9
Group III (n=16)	8	8

Learning Style Effects on Academic Achievement: Students in the three groups were subdivided by learning style to allow for this analysis. Utilizing a 3 treatment by 2 learning style by 3 times of measurement MANOVA, test scores were analyzed for all main affects and interaction affects. Results from this analysis indicated that the groups did change over time as a time main affect did occur. However, a group by learning style by time interaction affect was not found. Therefore, treatment and/or learning style did not have a greater significant affect on the demand knowledge test.

Table 2

Pretest, Short-term Posttest, and Delayed Posttest Score Comparison by Learning Style

Score	Pretest	Short-term Posttest 1	Delayed Posttest
Group I			
Field-Dependent (n=6)	38.00	60.00	59.33
Field-Independent (n=9)	44.22	60.22	67.56
Group II			
Field-Dependent (n=9)	52.00	66.89	70.89
Field-Independent (n=13)	40.46	52.92	65.69
Group III			
Field-Dependent (n=8)	39.00	52.25	57.25
Field-Independent (n=8)	48.00	64.00	66.50

Learning Style and Students' Perceptions: Analysis showed that independent and dependent learners, as determined by G.E.F.T. results, did not differ significantly with respect to their perceptions of the lecture on demand. Their perceptions also did not differ significantly for the multimedia module on demand. However, item analysis revealed that the field dependent and field independent learners did differ significantly in three areas: (1) ease of computer use, (2) the affect of sound, and (3) the belief that computer multimedia modules are more exciting than lecture presentations. Field dependent learners indicated that they believed that sound would have enhanced the multimedia program. Field independent learners, meanwhile felt the computer multimedia was easy to use and more exciting than lecture presentations.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this study, the following conclusions concerning the effects of learning style on academic achievement and perceptions of computer multimedia versus lecture instruction on demand concepts for the experimental groups were drawn. Analysis showed that learning style (field dependent/independent) coupled with treatment had no significant effect with respect to achievement on the agricultural economics demand knowledge test. Furthermore, it was found that learning style had no significant effect on the students' overall perceptions of lecture and multimedia instruction. However, dependent learners did express the need for sound in the multimedia module. Independent learners also indicated that they found the multimedia module easy to use and that they found it more exciting than traditional lecture.

Based on these conclusions, the following recommendations were made. Since this was a based line study, further studies need to be undertaken to see if these findings are consistent. Future studies of a similar nature should identify other valid and reliable tests that can be used to determine the affects of multimedia on other aspects of learning styles such as the affect that computer multimedia has on critical thinking skills.

The perceived impact that sound could have enhanced the program for dependent learners should be further studied to determine if this perceived need would improve academic achievement. Future studies should look at the impact a more sophisticated (i.e., animation and video) computer multimedia module has on academic performance and perceptions of the independent and dependent learners. Teachers who utilize this technology should strive to identify learning contexts in which computer multimedia applications produce superior academic achievement and positive perceptions for both types of learners.

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THE AFFECT OF LEARNING STYLE ON ACADEMIC ACHIEVEMENT AND PERCEPTIONS OF TWO METHODS OF INSTRUCTION

A Critique

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I enjoyed reading this manuscript and would commend the authors for utilizing a pretest-posttest control group experimental design. The researchers compared the extent to which academic achievement and attitude are affected by learning style. Three experimental groups were defined based on whether students used multimedia, lecture or both in the instruction of an economics topic of "Demand Principles". The learning styles analyzed were field dependent and field independent as determined by the Group Embedded Figures Test (G.E.F.T.).

The investigators laid a sound theoretical framework and established the need for the study in their introduction. Procedures used were explained although one might question why the learning styles were not determine before random assignment of students to groups. It would seem that a more equal number could be achieved if learning styles were determine before random assignment was made. An explanation for the attrition of students from 75 to 53 would have been helpful.

Reliability coefficients were reported and except for the lecture perception questionnaire, all measures appeared to be consistent. The investigators adequately explained how validity of instruments was determined.

The researchers were careful to confine their conclusions to the specific topic taught. The topic would seem to be paramount since topics lend themselves to different techniques. No rationale was provided for selecting the topic used in the experiment. Was this a convenient topic to test these techniques or did the researchers specifically select the topic based on other reasons?

Although the researchers were careful to confine their results to the stated objectives, I wonder if they have shortchanged their data. First, are the discrepencies in pretest scores across groups significant? If so, why not statistically control for these differences in your analysis? Are there practical interpretations of Table 2 that could provide insight into designing additional research? Lastly, the recommendations were primarily directly toward additional research; based on the findings, what recommendations can be made regarding teaching this topic?

Again, the researchers are to be commended for utilizing an experimental design and for addressing a relevant topic. Perhaps, in agricultural education we should learn from our colleagues in other agricultural areas and strengthen such studies by replicating the work with different topics and students.

THE ACHIEVEMENT OF STUDENTS ENTERING THE COLLEGE OF AGRICULTURE AT THE UNIVERSITY OF IDAHO - 1985 TO 1989

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INTRODUCTION

The need for qualified graduates in the occupational areas of agriculture make it imperative that colleges of agriculture continue to recruit students who will be successful. However, there are many ideas about what makes successful students and how we should go about recruiting them.

Many land grant institutions have been increasing admissions requirements. These increases in standards are a concern for many colleges of agriculture as most of their traditional students come from vocational programs. Riesenberg (1990) stated the problem in the following way:

> New standards in education, a result of the Excellence in Education movement, required high school students to meet more stringent graduation and college entrance requirements, and usually the new standard did not include vocational education, especially vocational education in agriculture. (p. 27)

Before effective marketing efforts can be undertaken, it is important to assess the current students. We need to be able to answer some basic questions. Can we describe the students who have been attending colleges of agriculture? What characteristics can be used to describe a successful student? What characteristics of successful or unsuccessful students can be determined using pre-college demographic information?

PURPOSE OF THE STUDY

This study was conducted to describe students in a quantitative and demographic manner and to assess their academic success in college. The specific objectives of the study were to:

1. describe the students who were new to the University of Idaho College of Agriculture for the fall semesters of 1985 through 1989 using pre-college demographic and achievement data.
2. describe the academic achievement attained in college by students who were new to the University of Idaho College of Agriculture for the fall semesters of 1985 through 1989.
3. describe the variability in academic achievement attained in college by students who were new to the University of Idaho College of Agriculture for the fall semesters of 1985 through 1989 using pre-college demographic and achievement data.

PROCEDURES

The population of this study was 361 students who enrolled in the University of Idaho's College of Agriculture for the Fall semesters of 1985 through 1989. Excluded from the population of this study were students who majored in Agricultural Engineering, Bacteriology and Home Economics. The total population served as the subjects of this study.

The data used in this study were collected from two different sources. The pre-college demographic and achievement data were complied from an entering student survey as a part of a longitudinal study in the Department of Agricultural and Extension Education. A survey questionnaire had been utilized at the beginning of each fall semester to collect pre-college demographic and achievement data from first time students entering the College of Agriculture. The second source of data, university academic achievement, were supplied by the University of Idaho Office of Management Information Services.

Of the 361 students in the population of this study, 283 or 78 percent had completed the pre-college survey questionnaire and were accepted for use in the analysis.

FINDINGS

Objective 1

Seventy-six percent of the students were from Idaho. Over 69 percent of the students entering the college had lived on a farm or rural acreage. Almost equal percentages came from each of the four Idaho high school size classifications. Eighteen percent (18.0%) had attended A-2 (799-350 students) high schools and 19.8 percent attended A-3 (349-150 students) high schools.

Almost 80 percent of the students were under the age of 21 and females comprised 42.8 percent. More than 26 percent of the students had attended another higher education institution before transferring to the University of Idaho.

Of the high schools attended by the students in this study, 69.1 percent offered secondary agriculture and 56.2 percent of the incoming students had participated in one or more semesters of secondary agriculture in high school. More than 51 percent participated in one year or more of FFA and 58.2 percent participated in one year or more of 4-H.

When classified by the sureness of their decision about college and career goals, 64.5 percent of the students were absolutely sure of their decision to attend the College of Agriculture. Only 1.1 percent were absolutely unsure of their decision. Students were less sure of their career goal or of the decision to major in their selected area.

The mean high school grade point average for the students of this study was a 3.23 on a 4.0 scale. They also had achieved a mean percentile of 0.29 for their class rank and had a mean score of 21.44 on the American College Testing Exam (ACT).

Objective 2

The students had a mean grade point average of 2.49 at the end of their first semester at the University of Idaho, however, 25.8 percent had a grade point average lower than 2.0. The students had successfully completed a mean of 12.99 credits for the first semester at the University of Idaho. Seventy-five percent (75.0%) of the students in the study returned to the University of Idaho for their second year and 55.7 percent returned for their third year.

For students who entered the University of Idaho in 1985, 23.4 percent graduated in four years or less and 40.6 percent graduated in five years or less.

Objective 3

Another objective of the study was to describe the variability in university academic achievement among these students. Seven academic variables were used. These variables were:

1. grade point average (GPA) for the first semester,
2. number of credits successfully completed during the first semester,
3. average number of credits earned per semester *(retained freshmen students only)*,
4. cumulative GPA after three semesters,
5. cumulative GPA after five semesters,
6. percent of students returning for the second year, and
7. percent of students returning for the third year.

When the students were classified by their high school GPA there was a significant difference in all but one of the seven academic variables (Table 1).

Table 1

College academic achievement variables, means, percentages and related tests comparing incoming students grouped by high school GPA.

Variables	Mean	F-value	Probability
First semester GPA		19.1638	0.0000*
H. S. GPA Below 3.0 (n=64)	2.06		
H. S. GPA 3.00 to 3.49(n=95)	2.37		
H. S. GPA 3.50 to 3.74(n=56)	2.68		
H. S. GPA 3.75 to 4.0(n=41)	3.27		
First semester credits		12.8179	0.0000*
H. S. GPA Below 3.0 (n=64)	11.51		
H. S. GPA 3.00 to 3.49(n=95)	12.56		
H. S. GPA 3.50 to 3.74(n=56)	14.00		
H. S. GPA 3.75 to 4.0(n=41)	15.17		
Credits earned per semester (*Retained freshmen students only*)		9.5730	0.0000*
H. S. GPA Below 3.0 (n=14)	12.22		
H. S. GPA 3.00 to 3.49(n=42)	12.81		
H. S. GPA 3.50 to 3.74(n=19)	14.92		
H. S. GPA 3.75 to 4.0(n=20)	15.70		
Cumulative GPA for 3 semesters		11.6904	0.0000*
H. S. GPA Below 3.0 (n=38)	2.38		
H. S. GPA 3.00 to 3.49(n=67)	2.38		
H. S. GPA 3.50 to 3.74(n=34)	2.78		
H. S. GPA 3.75 to 4.0(n=31)	3.14		
Cumulative GPA for 5 semesters		8.9257	0.0000*
H. S. GPA Below 3.0 (n=20)	2.49		
H. S. GPA 3.00 to 3.49(n=45)	2.44		
H. S. GPA 3.50 to 3.74(n=17)	2.98		
H. S. GPA 3.75 to 4.0(n=14)	3.17		

Variables	Percentage	Chi-Square	Probability
Percent returning year two		7.27964	0.0635
H. S. GPA Below 3.0 (n=38)	63.3		
H. S. GPA 3.00 to 3.49(n=67)	81.7		
H. S. GPA 3.50 to 3.74(n=34)	75.6		
H. S. GPA 3.75 to 4.0(n=31)	81.6		
Percent returning year three		9.96410	0.0189*
H. S. GPA Below 3.0 (n=19)	40.4		
H. S. GPA 3.00 to 3.49(n=45)	70.3		
H. S. GPA 3.50 to 3.74(n=16)	55.2		
H. S. GPA 3.75 to 4.0(n=14)	58.3		

* $p < .05$

As the students' high school GPA increased, there was an increase in the means of the university academic achievement variables. As an example of these increases, those who had a high school GPA below 3.00 attained a mean college GPA of 2.06, while those with a high school GPA above 3.75 attained a mean 3.27 GPA in college during the first semester. There was also a significant difference in the mean number of credits per semester that were earned. Those with the highest high school GPA also successfully completed more college credits per semester.

When the students were classified by their high school GPA, the only academic achievement variable that did not result in a significance difference was the percent returning for the second year. However, the variable of percent returning for the third year did show a significant difference. Students with a high school GPA of 3.00 to 3.49 had the highest return rate of 70.3 percent. The next highest return rate was the group with a high school GPA of 3.75 to 4.00 with a percent return of 58.3 percent. Those with a high school GPA below 3.00 showed a return rate of 40.4 percent.

When students were grouped by the amount of selected coursework taken in high school, significant differences were found in the students' achievement in college. When students were grouped by the amount of high school calculus, chemistry, physics, foreign language and trigonometry, significant differences were found in the university academic achievement variables of first semester GPA and the number of credits for the first semester. When the university academic achievement variable of cumulative GPA after three semesters was tested, a significant difference was found when students were grouped by the amount of selected coursework taken in high school in the subject matter areas of calculus, chemistry, physics and trigonometry.

When students were grouped by the amount of selected coursework taken in high school in the subject matter areas of foreign language, algebra and physics, significant differences were found in the university academic achievement variable of credits earned per semester. For the university academic achievement variable cumulative GPA after five semesters, a significant difference was found when students were grouped by the amount of foreign language taken in high school. No significant differences were found for the university academic achievement variable percent returning for the second year. For the university academic achievement variable percent returning for the third year, significant differences were found when students were grouped by the amount of selected coursework taken in high school in the subject matter areas of chemistry, foreign language and physics. When students were grouped by the amount of selected coursework taken in high school in the subject matter areas of biology and English, no significant differences were found in any of the seven university academic achievement variables.

When students were grouped by college major, significant differences were found only in the university academic achievement variables of cumulative GPA after the third and fifth semesters (Table 2). The Plant Soil and Entomology students had the highest mean cumulative GPA after the fifth semester with a 3.09. The students majoring in General Agriculture and Agricultural Mechanization attained the lowest mean with a cumulative GPA of 2.41.

Table 2
College academic achievement variables, means, percentages and related tests comparing incoming students by entering major.

Variables	Mean	F-value	Probability
First semester GPA		1.7539	0.1228
Agricultural Education (n=33)	2.32		
Agricultural Economics (n=42)	2.36		
General/Mechanization (n=27)	2.36		
Animal Science (n=56)	2.38		
Plant Soil & Entomology (n=31)	2.66		
Veterinary Science (n=75)	2.72		

(Table 2 continues on the next page.)

Table 2 (*Continued*)
College academic achievement variables, means, percentages and related tests comparing incoming students by entering major.

Variables	Percentage	Chi-Square	Probability
First semester credits		0.6006	0.6995
Agricultural Education (n=33)	12.33		
Agricultural Economics (n=42)	12.93		
General/Mechanization (n=27)	12.40		
Animal Science (n=56)	13.12		
Plant Soil & Entomology (n=31)	13.10		
Veterinary Science (n=75)	13.38		
Credits earned per semester (Retained freshmen only)		0.5053	0.7715
Agricultural Education (n=9)	12.98		
Agricultural Economics (n=19)	14.22		
General/Mechanization (n=12)	13.86		
Animal Science (n=23)	13.56		
Plant Soil & Entomology (n=6)	12.85		
Veterinary Science (n=24)	14.28		
Cumulative GPA for three semesters (*Retained freshmen students only*)		3.0601	0.0114*
Agricultural Education (n=22)	2.44		
Agricultural Economics (n=29)	2.55		
General/Mechanization (n=17)	2.31		
Animal Science (n=34)	2.47		
Plant Soil & Entomology (n=22)	2.80		
Veterinary Science (n=49)	2.89		
Cumulative GPA for five semesters		2.7263	0.0242*
Agricultural Education (n=12)	2.54		
Agricultural Economics (n=19)	2.55		
General/Mechanization (n=9)	2.41		
Animal Science (n=16)	2.47		
Plant Soil & Entomology (n=14)	3.09		
Veterinary Science (n=28)	2.82		
Percent returning year two		2.96331	0.7057
Agricultural Education (n=22)	68.8		
Agricultural Economics (n=29)	76.3		
General/Mechanization (n=17)	73.9		
Animal Science (n=34)	69.4		
Plant Soil & Entomology (n=22)	75.9		
Veterinary Science (n=49)	81.7		
Percent returning year three		5.80324	0.3258
Agricultural Education (n=12)	41.4		
Agricultural Economics (n=18)	72.0		
General/Mechanization (n=9)	50.0		
Animal Science (n=15)	51.7		
Plant Soil & Entomology (n=14)	56.0		
Veterinary Science (n=28)	59.6		

* $p < .05$

There were significant differences between students who had taken vocational agriculture and those who had not in the university academic achievement variables (Table 3). Students who had not taken secondary agriculture achieved significantly better than those who had taken some secondary agriculture.

Table 3
College academic achievement variables, means, percentages and related tests comparing incoming students by whether they participated in a secondary agriculture class during high school.

Variables	Mean	F-value	Probability
First semester GPA		6.6766	0.0103*
No secondary Ag. (n=118)	2.66		
Some secondary Ag. (n=153)	2.37		
First semester credits		0.5905	0.4429
No secondary Ag. (n=118)	13.18		
Some secondary Ag. (n=153)	12.85		
Credits earned per semester *(Retained freshmen students only)*		3.0952	0.0818
No secondary Ag. (n=38)	14.49		
Some secondary Ag. (n=58)	13.43		
Cumulative GPA for three semesters		6.6239	0.0109*
No secondary Ag. (n=78)	2.78		
Some secondary Ag. (n=99)	2.50		
Cumulative GPA for five semesters		5.7023	0.0189*
No secondary Ag. (n=43)	2.84		
Some secondary Ag. (n=56)	2.54		
Variables	Percentage	Chi-Square	Probability
Percent returning year two		3.98726	0.0458*
No secondary Ag. (n=78)	82.1		
Some secondary Ag. (n=99)	69.7		
Percent returning year three		0.31153	0.5767
No secondary Ag. (n=43)	58.9		
Some secondary Ag. (n=54)	53.5		

* $p<.05$

Those students who had not taken secondary agriculture averaged a first semester GPA of 2.66 and those who had taken secondary agriculture averaged a 2.37 GPA. After five semesters, the cumulative GPA was 2.84 for those students who had not taken secondary agriculture and 2.54 for those who had taken some secondary agriculture.

Significant differences were found for all 7 of the academic achievement variables when students were grouped by ACT scores (Table 4). Students who had a composite ACT score below 19 had significantly less academic achievement than those with a score 19 or above.

Table 4
College academic achievement variables, means, percentages and related tests comparing incoming students grouped by ACT composite score.

Variables	Mean	F-value	Probability
First semester GPA		31.7719	0.0000*
ACT below 19 (n=53)	1.83		
ACT 19 and above (n=141)	2.63		
First semester credits		18.3390	0.0000*
ACT below 19 (n=53)	11.11		
ACT 19 and above (n=141)	13.47		
Credits earned per semester (*Retained freshmen students only*)		11.0788	0.0013*
ACT below 19 (n=18)	11.76		
ACT 19 and above (n=61)	14.19		
Cumulative GPA for three semesters		13.2376	0.0004*
ACT below 19 (n=29)	2.13		
ACT 19 and above (n=99)	2.66		
Cumulative GPA for five semesters		11.2681	0.0013*
ACT below 19 (n=15)	2.17		
ACT 19 and above (n=58)	2.72		
Variables	Percentage	Chi-Square	Probability
Percent returning year two		13.03851	0.0003*
ACT below 19 (n=29)	55.8		
ACT 19 and above (n=99)	83.2		
Percent returning year three		9.15112	0.0025*
ACT below 19 (n=14)	35.0		
ACT 19 and above (n=57)	65.5		

* $p<.05$

Students with a ACT composite of less than 19 attained a first semester GPA of 1.83, while those with a ACT composite 19 or above attained a GPA of 2.63. After five semesters, students with a ACT composite of less than 19 attained a mean GPA of 2.17, while those with a ACT composite 19 or above attained a mean GPA of 2.63. Those students with a ACT composite score of less than 19 had a return rate of 55.8 percent and 35.0 percent for years two and three, respectively.

Students who had participated in FFA attained a first semester GPA of 2.26, while those who had not participated in either 4-H or FFA attained a first semester GPA of 2.62. The students who had participated in 4-H attained a GPA of 2.69. Students who entered the university in 1986 earned a low of 12.33 first semester credits, and 1989 students earned a high of 14.60 first semester credits.

When the demographic data of size of high school attended, state in which students attended high school, whether family members attended the University of Idaho, sureness of the students' decisions and home residence were used to group the students, no significant differences were found in the university academic achievement variables.

CONCLUSIONS AND IMPLICATIONS

The decline in enrollments at the University of Idaho's College of Agriculture prompted the college to begin recruitment programs to attract more students. Although attempts have been made to recruit students from new populations, it appears that little real difference has been achieved at the University of Idaho.

Recruitment efforts must become research based and results oriented. More research is necessary to determine who the students are that attend colleges of agriculture and what recruitment efforts are most successful.

Another area which requires research based programming is the retention of students. Research is needed to determine why students drop out and what can be done to keep a higher percentage in school. Small increases in the retention rate could be a college of agriculture's best recruitment program.

When considering the findings of this study, it appears clear that a high school GPA of 3.00 and above and an ACT composite score of 19 or more can help students in evaluating their academic preparedness. This information should be used by college and high school personnel to assist students in making educational decisions.

Although there appears to be a relationship between some of the courses taken in high school and success in college, the reasons for this relationship were not a part of this study. Are these courses being taken by the more academically able students thus related to success in college, or do they truly help all students become more academically able?

The analysis of the data concerning those students who had participated in secondary agriculture programs brings up some interesting questions. This was the only high school course or program which was analyzed in this study that had a significant inverse relationship on students' achievement in college. The investigators conclude there exists in Idaho a unique population of students who take secondary agriculture and then attend the College of Agriculture.

The reaction of those reading this study might be to conclude that students who have taken secondary agriculture in high school are not the best students to be recruited. However, even though the percent returning for the second year was significantly lower (82.1%, no secondary agriculture, 69.7, secondary agriculture) the number of students retained was considerably higher. However, 99 students who had taken secondary agriculture returned for the second year, and 78 students who did not take any secondary agriculture returned for the second year. Because the College has not substantially changed its target population for recruitment and students who have taken secondary agriculture are still the major component of the retained students, the investigators suggest that it would be ill-advised to conclude that students from secondary agriculture programs should be discounted in recruitment efforts.

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THE ACHIEVEMENT OF STUDENTS ENTERING THE COLLEGE OF AGRICULTURE AT THE UNIVERSITY OF IDAHO -1985 TO 1989

A Critique

Richard I. Carter, Iowa State University--Discussant

I commend the investigators for conducting research on college-wide issues which impact agricultural education programs at the secondary and university levels. Agricultural educators can provide an important service to the college, and at the same time, gain recognition and respect from administrators and colleagues in other agricultural areas. Agricultural education departments provide an important link between high schools and colleges of agriculture.

The researchers are to be commended for the longitudinal research efforts in this area of concern. Through such focused efforts, trends can be established and strategic plans can be developed. I did wonder why the researches did not utilize past results to draw such trends. The investigators utilized established variables, such as GPA and ACT scores, to make their comparisons which allow readers to easily have benchmarks to use in interpret the findings. The findings were presented in a complete and orderly manner, and the researchers were cautious in their interpretations and generalizations..

The researchers were brief in building a theoretical foundation for the study and in particular in citing and tying relevant literature to the findings. Please do not misinterpret this comment to mean that a large portion of the paper should be devoted to citing literature. Too often that is the case in agricultural education research leaving little space for reporting the findings, conclusions, and recommendations. What I am suggesting is: where these results consistent with past findings in Idaho and nationally?

There are several questions which can be raised in regard to this study. First, how can you have a mean percentile of 0.29 for high school rank? What does this figure mean? How was high school GPA attained? Based on the findings, can more specific recommendations be made to assist faculty in advising students? In reviewing the manuscript, I was disappointed with the conclusions and recommendations section. Was an attempt made to analyze the relationship among factors such as GPA and whether they had taken high school agriculture? If GPA was controlled for, would there be a significant difference in the factors studied between students who took agriculture in high school and those who did not take agriculture?

In conclusion, I commend the researchers on both the topic and the manner in which they conducted the study. It is important for agricultural educators to conduct this type of research.

EXPERIENCES RELATED TO THE LEADERSHIP SKILLS OF COLLEGE OF AGRICULTURE STUDENTS

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INTRODUCTION

The view of what leadership is and who can exercise leadership has changed considerably through the years. Leadership competencies have remained somewhat constant, but the understanding of what leadership is, how leadership works, and the ways in which people learn to apply leadership has changed. Leaders were once thought to have been born, not developed, summoned to their calling through some enlightening process. This belief was commonly called the "great man" theory (Bennis & Nanus, 1985).

Numerous studies have been conducted to evaluate the results of leadership development programs (Howell, 1974; Martin, 1977; Miller, 1976; Giebrink, 1975). Each of these researchers reported that the programs were successful in meeting their intended objectives, but few evaluated the leadership qualities of participants prior to formal leadership development activities (Luft, 1986). Luft examined the perceived leadership abilities of young adults in North Dakota. He found a significant difference in leadership traits of respondents when grouped by gender and by educational level. Luft concluded that educational attainment was a primary indicator of individual leadership ability. However, he was unable to identify how educational experience contributed to the development of leadership abilities.

Love and Yoder reported on their assessment of undergraduate education in colleges of agriculture in the United States. These researchers found that agriculture faculty were divided with regard to the need to reinforce interpersonal and leadership skills within courses offered in the major field of study. Love and Yoder also concluded that undergraduate students perceived that college of agriculture efforts to develop leadership skills were inadequate.

PURPOSE

The primary purpose of this study was to assess the characteristics, experiences, and activities which were related to the perceived leadership abilities of College of Agriculture students. This study was designed to answer the following research questions:

1. What are the perceived leadership abilities of junior and senior students enrolled in the College of Agriculture?
2. What demographic characteristics account for the variance in the perceived leadership abilities of College of Agriculture students?
3. To what degree does participation in activities or organizations account for the variance in the perceived leadership abilities of College of Agriculture students?

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PROCEDURES

This study utilized an ex post facto design. The independent variables were selected demographic characteristics and respondent participation in activities and organizations. The dependent variables were four factors describing the self-perceived leadership abilities of the respondents. The population for the study included all junior and senior level students enrolled in the College of Agriculture at the University of Missouri during the Winter semester of 1991. There were 856 students in the target population. A 50% random sample was selected to provide data for the study which exceeded the minimum sample size needed to represent the population according to Krejcie and Morgan (1970).

The data collection instrument was a revised version of the instruments used by Luft (1986) and Schumacher (1990). Part one included 48 statements asking respondents to rate their leadership abilities. Part two requested respondents to identify the organizations and activities they participated in during high school and college. Part three collected demographic information from respondents. The revised instrument was validated following a review by a national panel of experts in leadership development. Reliability was estimated on the 48 leadership statements in part one of the instrument by calculating a Cronbach's coefficient alpha of .937 following data collection.

ANALYSIS OF DATA

Statistical analysis involved computing means and standard deviations to answer research question one. Stepwise regression analysis was employed to identify characteristics which could explain a significant portion of the variance associated with the dependent variables for research questions two and three. The a priori alpha level was established at .05.

RESULTS

Responses were collected from 220 of the 428 students selected for inclusion in the research sample which represented a 51% response rate. Early and late respondents were compared using the four leadership factor means and no significant differences were found. Therefore, it was concluded that the results of this study could be generalized to the target population.

Respondents rated their perceived leadership abilities above the midpoint on a 1 to 6 Likert-type scale. Over half of the 48 items received mean ratings above 5.0 on the six-point scale. Principal components factor analysis with varimax rotation was used to group the 48 leadership statements into four factors as reported in Table 1. The four factors were labeled Interpersonal Relations, Administration, Management of Self, and Communication. Mean factor scores were computed for each respondent by summing the responses to the statements which comprised each factor and dividing by the number of statements to maintain the integrity of the response scale. Cronbach's coefficient alpha reliability estimates were calculated for each of the four factors. The reliability coefficients were computed as follows: Interpersonal Relations = .84, Administration = .82, Management of Self = .79, and Communication = .86.

Table 1. Means, standard deviations, and factor loadings for the four leadership factors.

Factor	Mean	S.D.	Factor loading
Interpersonal relations	5.18	0.46	
Flexible	5.08	0.84	.52
Listener	5.33	0.72	.67
Considerate	4.98	1.10	.51
Sensitive	5.12	0.77	.42
Understanding	5.56	0.61	.54
Sense of humor	5.33	0.69	.39
Trustworthy	5.29	0.66	.52
Conflict resolver	5.50	0.73	.53
Tactful	4.88	0.88	.59
Respectful	5.08	0.79	.60
Cordial	5.03	0.86	.45
Empathetic	5.07	0.87	.47
Interest in others	4.89	1.21	.56
Co-worker relations	5.54	0.67	.43
Administration	4.78	0.57	
Motivating	4.87	0.70	.51
Inspiring	4.68	1.22	.51
Acceptance as leader	4.74	0.82	.72
Looked to for advice	4.95	0.77	.62
Provides guidance	4.75	0.88	.53
Decision making	4.78	0.88	.54
Take charge	4.86	1.01	.55
Persuasive	4.52	1.19	.48
Others accept ideas	4.71	0.65	.41
Viewed professionally	5.00	0.93	.51
Management of Self	5.27	0.47	
Perseverance	5.17	0.80	.71
Success oriented	5.39	0.70	.50
Intelligent	5.26	0.65	.40
Dedication	5.21	0.83	.71
Goal oriented	5.33	0.82	.53
Achiever	5.29	0.71	.58
Enthusiastic	5.24	0.81	.57
Persistent	5.17	0.79	.62
Proficient	5.43	0.61	.44

Table 1. (Continued)

Factor	Mean	S.D.	Factor loading
Communications	4.67	0.65	
Community involvement	4.00	1.40	.60
Maintains good relations	5.19	0.91	.49
Shares information	5.22	0.86	.45
Encourages others	4.68	0.98	.60
Openly promotes ideas	4.90	0.93	.42
Expresses ideas	4.86	0.87	.52
Makes friends easily	5.02	1.01	.43
Convincing	4.69	0.67	.45
Leads group discussion	3.68	1.24	.48
Belongs to organizations	4.27	1.37	.73
Enjoys meeting people	5.15	0.88	.55

Means, standard deviations, and factor loadings were calculated for each of the 48 leadership statements. The Interpersonal Relations items produced a mean factor score of 5.18 with a standard deviation of 0.46. The other factor means and standard deviations were: Administration, 4.78 and 0.57; Management of Self, 5.27 and 0.47; and Communication, 4.67 and 0.65, respectively.

Students enrolled in the University of Missouri College of Agriculture as juniors and seniors perceived their leadership abilities to be good. Leadership abilities associated with the Interpersonal Relations factor and the Management of Self factor were perceived to be greater than those associated with the Administration factor and the Communication factor.

Stepwise regression procedures revealed that a significant portion of the variance associated with the Interpersonal Relations, Administration, and Communication factors could be explained by one or more of the demographic characteristics examined in this study. There were no characteristics which were found to explain a significant portion of the variance associated with the Management of Self factor.

A significant portion of the variance associated with the Interpersonal Relations factor was explained (8.5%) by the respondents' age and gender. Respondents who were older and females rated themselves higher on the Interpersonal Relations factor as reported in Table 2. Variance associated with the Administration factor was explained (5.9%) by location of the respondents' residence and the number of hours worked per week. Respondents who lived in a city or town, or worked more hours per week rated themselves higher on the Administration factor as reported in Table 3. Variance associated with the Communication factor was explained (5.5%) by the location of residence. Respondents who lived in a town or city also rated themselves higher on the Communication factor as reported in Table 4.

Table 2. Stepwise regression analysis of student characteristics on the Interpersonal Relations.

Variable	B	Partial R^2	F	p
Age	.0171	.0214	4.03	.0463
Gender[a]	.0102	-.2383	11.89	.0007

F = 8.08 Intercept = 5.167 R^2 = .085 [a] Gender was coded: 1 = female, 2 = male

Table 3. Stepwise regression analysis of student characteristics on the Administration factor.

Variable	B	Partial R^2	F	p
Residence[a]	-.1911	.024	4.42	.0369
Hours per week	.0102	.035	8.99	.0031

F = 5.43 Intercept = 4.9542 R^2 = .059

[a] Residence (while attending college): 1 = in town or city, 2 = on a farm

Table 4. Stepwise regression analysis of student characteristics on the Communications factor.

Variable	B	Partial R^2	F	p
Residence[a]	-.3125	.055	10.17	.0017

F = 10.17 Intercept = 5.185 R^2 = .055

[a] Residence (while attending college): 1 = in town or city, 2 = on a farm

Stepwise regression procedures revealed that a significant portion of the variance associated with the Interpersonal Relations, Administration, and Communication factors could be explained by the level of participation in selected organizations or activities. There was no activity or organization which was found to explain a significant portion of the variance associated with the Management of Self factor.

A significant portion of the variance associated with the Interpersonal Relations factor was explained (1.8%) by respondent participation in a foreign language club in high school. Variance associated with the Administration factor was explained (5.3%) by participation in student council activities while in high school. The Communication factor was explained (16.4%) by the respondents' participation in a foreign language club, intramural sports, church youth group, and livestock association.

Table 5. *Stepwise regression of participation in activities on the Interpersonal Relations factor*.

Variable	*B*	Partial R^2	*F*	*p*
Foreign language club	.1380	.018	4.15	.0429

$F = 4.15$ Intercept = 5.005 $R^2 = .018$

Table 6. *Stepwise regression of participation in activities on the Administration factor*.

Variable	*B*	Partial R^2	*F*	*p*
Student council	.2676	.053	12.31	.0005

$F = 12.31$ Intercept = 4.405 $R^2 = .053$

Although the variance accounted for was found to be statistically significant, the variables were of little practical significance in predicting the leadership abilities of upperclass college of agriculture students. Several characteristics accounted for a relatively small amount of the variance in the dependent variables. However, this study was unable to identify demographic characteristics, activities, or organizations which could explain a major portion of the variance associated with student leadership abilities.

The weakest area of perceived leadership skills among College of Agriculture students was reported in the communications area. This substantiates Luft's (1986) finding that speaking skills were perceived by young adults to be their weakest area of leadership. However, students who participated in a variety of student activities and organizations perceived themselves to possess greater communications skills. This finding would suggest that College of Agriculture students should be encouraged to participate in activities to enhance their communications skills.

Table 7. Stepwise regression of participation in activities on the Communication factor.

Variable	B	Partial R^2	F	p
Foreign language club	.2872	.035	10.51	.0014
Intramurals	.2148	.027	7.06	.0085
Church	.2226	.064	6.01	.0150
Livestock association	.3026	.037	8.78	.0034

F = 10.62 Intercept = 3.227 R^2 = .164

CONCLUSIONS

Based on the findings and results of this study, the following conclusions were formulated:

1. College of Agriculture students perceive themselves to have greater leadership skills in the areas of interpersonal relations and management of self than in the areas of administration and communication.

2. Students who are older, female, or members of a foreign language club perceive themselves to have greater interpersonal relation skills.

3. Students who live in a city or town while attending college, worked more hours per week, or were a member of student council in high school perceive themselves to have greater administrative skills.

4. Students who live in a city or town while attending college or who were members of a foreign language club, intramurals, church, or livestock association perceive themselves to have greater communications skills.

5. The communication skills of agriculture students are greater for those who participate in student organizations and activities.

RECOMMENDATIONS

Based on the results of this study, the following recommendations were formulated:

1. Students should be encouraged to participate in activities and organizations which develop their communication skills.

2. Students should be motivated to increase their level of participation and involvement in organizations and activities.

3. Further research should be conducted to identify opportunities to enhance the leadership abilities of College of Agriculture students.

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EXPERIENCES RELATED TO THE LEADERSHIP SKILLS OF COLLEGE OF AGRICULTURE STUDENTS

A Critique

Alfred J. Mannebach, University of Connecticut--Discussant

The researchers are to be commended for conducting this study on leadership skills for college of agriculture students. If student leadership skills are to be developed by college of agriculture faculty and programs, it is important to know what experiences students already possess, how experiences and activities students possess relate to leadership, and what the faculty can do to encourage, promote, and facilitate leadership skills. If student leadership skills are important, an underlying assumption is that colleges of agriculture faculty and administration must either identify, select, and enroll students who already possess leadership skills or develop leadership skills in students enrolled.

The study was well conducted. An adequate sample was studied, a valid and reliable instrument was used, and proper analysis of the data was conducted.

I have a question about the design of Part II of the instrument. According to the authors, Part II requested respondents to identify the organizations and activities they participated in during high school and college. Did the respondents supply the answers to these questions or were predetermined categories listed? If the questions were open ended supply type items, perhaps students would have forgotten or failed to identify the activity. A set of standardized items would probably be more appropriate in such a situation. Another question concerns the failure of the researchers to identify characteristics and participation in activities not found to explain a significant portion of the variance of the factors studied. Researchers conducting similar studies may find such information useful. Also, I was not able to ascertain the extent of involvement or the degree of participation or leadership attained by the information provided in the paper. More detail would have been helpful to the reader. According to the authors, over half of the 48 items received mean ratings above 5.0 on the six-point scale. Self perception of leadership abilities was high. A question I have is could these high self ratings be substantiated by observing or evaluating these student leadership abilities in real life roles?

In summary, this study addresses an important topic. I agree with the authors' third recommendation that further research should be conducted to identify opportunities which will enhance the leadership abilities of College of Agriculture students.

ANALYSIS OF 4-H PARTICIPATION AND LEADERSHIP LIFE SKILL DEVELOPMENT IN TEXAS 4-H CLUB MEMBERS

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INTRODUCTION

The 4-H program is an experiential education (learn by doing) program whose mission is to help youth become self-directing, productive, and contributing members of society. This mission is accomplished by involving youth in innovative educational programs that contribute to the development of skills useful for everyday living. Such skills are called leadership life skills and include the ability to work with and get along with others, to communicate, to make responsible decisions, and to have an understanding of themselves (Hoopfer, (1981).

During the last decade, educational agencies have come under extreme pressure to evaluate their effectiveness, in most cases to justify their existence. Historically, 4-H has relied on the faith and testimonials of its participants as the measure of its effectiveness. Today, however, experiential education is facing tougher critics who demand program evaluation and demonstrations of effective and efficient use of public funds.

Conrad and Hedin (1981) cite the lack of "hard" evidence concerning the impact of experiential education programs. They note that little effort has been made to test, systematically, the assumptions underlying the effectiveness of such programs, or to determine which specific forms of experiential programs may be most effective in realizing the hypothesized benefits. However, recent efforts have been made to evaluate experiential education programs, focusing on the improvement of self-concept in young people (Weatherford & Weatherford, 1985; Mueller, 1989), while other studies have attempted to measure life skills and leadership development (Heinsohn & Cantrell, 1986; Ladewig & Thomas, 1987). One feature missing in the design of such studies has been the inclusion of a comparison group. Does the level of leadership life skill development among 4-H members differ from that of non-4-H youth? This study sought to answer these and other questions.

PURPOSES AND OBJECTIVES

The major purpose of this study was to determine if Texas 4-H members had developed leadership life skills and ascertain if this skill development was related to their participation in the Texas 4-H program. A secondary purpose was to determine if Texas 4-H members differed from non-4-H youth in the development of leadership life skills.

Specific objectives of the study were to: (1) determine the extent to which Texas 4-H members and non-4-H youth perceive that they have developed leadership life skills; (2)

compare the perceived level of leadership life skill development between these two groups; (3) determine the relationship between the level of 4-H club participation and the perceived development of leadership life skills; (4) determine the relationship between the perceived contribution of 4-H participation and the development of leadership life skills; and (5) compare the level of involvement in school and community activities between 4-H club members and youth who had never participated in 4-H.

PROCEDURES

This study compared two populations: Texas 4-H club members, ages 13 to 19, and Texas youth in grades 7-12 who had never been 4-H club members. The 4-H sample (500 youth) was randomly chosen from 4-H club members, ages 13 to 19, in 19 randomly selected counties. The non-4-H sample (558 youth) consisted of youth enrolled in a randomly chosen English or Language Arts class from each of the 28 participating schools. Participating schools were randomly selected from all Texas schools offering some combination of grades 7 through 12 in 1991.

This study used similar instruments to collect data from the two groups. The Leadership Life Skill Inventory (LLSI) contained 67 questions divided into five sections. Section I identified respondent characteristics such as age, gender, ethnicity, and area of residence. Section II assessed the extent of participants' involvement in school and community activities using a four point scale (1 = Not a Member, 2 = Slightly Active, 3 = Moderately Active, and 4 = Very Active). Section III contained questions to determine the level of leadership life skill development of respondents. Most of the 21 leadership life skill statements were adapted from the Leadership and Personal Development Inventory developed at Iowa State University (Carter, 1989). These statements were grouped into five measurement scales: Working With Groups, Understanding Self, Communicating, Making Decisions, and Leadership. Responses were coded using a six point Likert-type scale with the following choices: 1 = Strongly Disagree, 2 = Disagree, 3 = Slightly Disagree, 4 = Slightly Agree, 5 = Agree, and 6 = Strongly Agree. Section IV assessed how much 4-H members felt that 4-H contributed to their development of leadership life skills. Again, a Likert-type scale was used to measure their responses using the following values: 1 = Did Not Contribute, 2 = Contributed Slightly, 3 = Contributed Somewhat, and 4 = Contributed Greatly. The final section measured 4-H club members' level of involvement in 19 4-H activities. This section was not administered to the non-4-H sample.

The instrument was reviewed by Agricultural Education and Extension faculty and was determined to have acceptable content validity. Twenty-four 4-H club members and 24 eighth grade youth not in the sample were used to pilot test the instrument to determine its face validity and assess internal reliability. The five measurement scales yielded Cronbach's coefficient alphas ranging from .59 to .84.

Questionnaire packets were mailed to the 500 4-H club members in January, 1991. Two follow-up contacts were made at approximately two week intervals, yielding 309 instruments, a 62 percent rate of return. A sample of 27 non-respondents were compared to respondents on personal characteristics, participation in school and community activities, leadership life

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skill development, and 4-H participation. Comparison procedures indicated that non-respondents did not differ from respondents on any of the variables. During the same period of time, questionnaire packets were mailed to the counselors at the 28 schools chosen to participate. All schools returned the surveys, providing a sample size of 558 non-4-H youth.

ANALYSIS OF DATA

Descriptive statistics were used for reporting personal characteristics of respondents, participation in school and community activities, leadership life skill development, and participation in 4-H activities. Comparison of the perceived level of leadership life skill development between 4-H club members and youth who had never participated in 4-H (Objective 2) was accomplished by conducting t-tests on the scale means between the two groups. To determine the relationship between the level of 4-H club participation and the perceived development of leadership life skills (Objective 3), Pearson product moment correlation coefficients between the 4-H participation score and each of the five leadership life skill scales was computed. Pearson product moment correlation was also used to determine the relationship between the perceived contribution of 4-H participation and the development of leadership life skills (Objective 4). The comparison of the level of involvement in school and community activities between 4-H and non-4-H youth (Objective 5) was accomplished by conducting t-tests between the means of 4-H and non-4-H youth for each of the activities. Phi coefficients were computed to quantify the relationship between participation in school and community activities and membership in 4-H.

RESULTS

Life Skill Development

Table 1 contains descriptive data for each of the measurement scales. All scales for 4-H club members had means of 4.78 or greater, indicating that 4-H club members perceived that they had developed the leadership life skills being measured. The Working with Groups and Understanding Self scales each had a mean score of 5.30, suggesting that 4-H members perceived themselves as having a higher level of skills described by these two scales than the remaining scales. Making Decisions and Communicating had mean scores of 5.02 and 4.98, respectively, indicating "agreement" with the scale statements. The Leadership scale yielded the lowest mean score (4.78).

Means for the scales measuring leadership life skills for non-4-H youth ranged from 4.38 to 5.10. The scale Understanding Self had the highest mean (5.10), indicating that non-4-H youth believed their leadership life skill development to be higher in this area than in the other scales. The remaining scales had means ranging from 4.38 to 4.95, indicating "slight agreement" to "agreement" with the statements comprising these scales.

The results of these comparisons and the corresponding t-values are also reported in Table 1. T-values were significant at the .01 level on all scales, indicating that 4-H club members' perceived level of leadership life skill development was significantly greater than that of non-4-H youth.

Table 1. Comparison of the Perceived Level of Leadership Life Skill Development of 4-H and Non-4-H Respondents.

Scales	N	Means[a]	SD	t-value
Working With Groups				
4-H	308	5.30	.50	8.15*
Non-4-H	556	4.95	.74	
Understanding Self				
4-H	309	5.30	.64	4.12*
Non-4-H	556	5.10	.73	
Communicating				
4-H	309	4.98	.75	5.19*
Non-4-H	553	4.69	.85	
Making Decisions				
4-H	308	5.02	.80	3.63*
Non-4-H	554	4.80	.87	
Leadership				
4-H	309	4.78	.87	6.80*
Non-4-H	554	4.38	.99	

Note. [a]1=Strongly Disagree, 2=Disagree, 3=Slightly Disagree, 4=Slightly Agree, 5=Agree, 6=Strongly Agree. *p<.01.

4-H Participation and Life Skill Development

The scores from Section V of the instrument were summed to obtain a 4-H participation score. As shown in Table 2, a moderate, positive relationship existed between the level of 4-H participation and the perceived development of leadership skills (r = .33). The relationships between 4-H participation and the other four scales ranged from .17 to .27, indicating low, positive, statistically significant relationships between the variables. So, in all five instances, as 4-H participation increased, the perceived level of leadership life skill development increased.

However, a simple correlation cannot account for the effects of other variables; therefore, a hierarchial multiple regression model was developed to control for extraneous variables (Kerlinger & Pedhazur, 1973). Each measurement scale was regressed on the variables gender, age, ethnicity, place of residence, participation in non-4-H activities, and level of participation in 4-H. As indicated in Table 3, when controlling for extraneous variables, the level of 4-H participation still explained a statistically significant amount of variance in three of the scales. From 1.7 to 3.3 percent of the variance in the scales Working With Groups,

Table 2. Pearson Product Moment Correlation Coefficients Between Level of 4-H Participation and Perceived Development of Leadership Life Skills Among Texas 4-H Club Members.

Scale	4-H Participation r[a]	 R^2
Leadership	.33*	.11
Communicating	.27*	.07
Working with Groups	.24*	.06
Decision Making	.19*	.04
Understanding Self	.17*	.03

Note. [a] Pearson product moment correlation. *$p < .01$.

Table 3. Hierarchial Inclusion of the Level of 4-H Participation on Independent Variables.

Scales Variables	Multiple R	R^2	R^2 Change	Sig. F Value	F
Working With Groups					
Gender	.173	.030	.030	.002	9.44
Age	.176	.031	.001	.562	4.88
Ethnicity	.240	.057	.027	.078	3.07
Place of Residence	.268	.072	.015	.199	2.58
Non-4-H Activities	.336	.113	.041	.0003	3.79
4-H Participation	.371	.138	.025	.004	4.31
Communicating					
Gender	.109	.012	.012	.055	3.70
Age	.208	.043	.031	.002	6.91
Ethnicity	.244	.059	.016	.270	3.18
Place of Residence	.274	.075	.016	.168	2.70
Non-4-H Activities	.404	.163	.088	.000	5.82
4-H Participation	.425	.181	.017	.013	5.95
Leadership					
Gender	.111	.012	.012	.051	3.84
Age	.235	.055	.043	.0001	8.94
Ethnicity	.261	.068	.013	.385	3.68
Place of Residence	.276	.076	.008	.447	2.75
Non-4-H Activities	.446	.199	.123	.000	7.40
4-H Participation	.482	.232	.033	.0004	8.17

Communicating, and Leadership can be explained by the level of participation in 4-H activities after the effects of gender, age, ethnicity, place of residence, and level of participation in non-4-H activities have been removed.

Perceived Contribution of 4-H Participation

In Section IV of the research instrument, 4-H club participants were asked to respond to five statements indicating the degree to which they felt that 4-H contributed to their development of leadership life skills. Each statement related to one of the leadership life skill scales measured in Section III. Possible responses included: 1=Did Not Contribute, 2=Contributed Slightly, 3=Contributed Somewhat, and 4=Contributed Greatly. Mean scores ranged from 2.90 to 3.29. Seventy percent or greater of the 4-H participants indicated that 4-H "contributed somewhat" or "contributed greatly" for all five areas of contribution to 4-H.

Correlation coefficients were computed to measure the association between the degree to which 4-H contributed to the development of leadership life skills and the perceived level of leadership life skill development. A moderate, positive relationship (.43) existed between the level of 4-H contribution and the skill of "...how to run a meeting and to lead others." The level of contribution of 4-H to the development of decision making skills exhibited a moderate, positive relationship (.33). A low, positive relationship (.15 - .27) existed between the remaining statements and their corresponding scales.

Comparison of Involvement in School and Community Activities

T-tests were used to compare the mean participation scores for 17 school and community activities between 4-H club members and non-4-H youth. 4-H club members were found to participate to a significantly higher degree in Career Related Clubs, Subject Matter Clubs, Junior Livestock Associations, and Church Youth Groups. In addition, the percentage of 4-H club members participating in Junior Livestock Associations, Career Related Clubs, Subject Matter Clubs, Student Government, Band/Music/Choir, Academic Contests, School Athletics, Church Youth Groups, and Other Clubs/Associations was significantly greater than the percentage of non-4-H youth as indicated by the Phi coefficients. Non-4-H youth had a significantly greater percentage of participation than did 4-H club members in only one activity.

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions are based on the major findings of the study.

1. 4-H club members perceived themselves as having a higher level of leadership life skill development for the scales Working With Groups, Understanding Self, Making Decisions, and Communicating than for the Leadership scale.

2. For non-4-H youth, the mean scores for the scales Working With Groups, Communicating, Making Decisions, and Leadership indicated "slight" agreement with these statements. The mean score for Understanding Self (5.10) indicated a higher level of

leadership life skill development than for the other four scales.

3. 4-H club members perceived themselves as having developed significantly greater levels of leadership life skills on all measurement scales than youth who had never participated in the 4-H club program.

4. The level of participation in 4-H was related to the development of leadership life skills. Low to moderate, positive relationships existed between 4-H participation and the development of leadership life skills.

5. A positive relationship existed between how much 4-H members perceived that 4-H contributed to their leadership life skill development and their perceived level of leadership life skill development.

6. 4-H club members were significantly more active than their peers in career related clubs, subject matter clubs, junior livestock associations, and church youth groups, and the percentage of 4-H club members participating was significantly greater than non-4-H youth in nine of the 17 school and community activities.

The following recommendations for action are based on the findings and conclusions of this study.

1. The Texas Agricultural Extension Service should make a greater effort to attract non-4-H youth to the 4-H program. In addition, a greater effort should be made to provide opportunities for non-4-H youth, outside of the traditional 4-H club program, to develop leadership life skills.

2. The Texas 4-H program should find ways to increase the involvement of Texas 4-H club members.

The study also left some questions unanswered and raised several additional questions, suggesting the following topics for additional research.

1. This study should be replicated with 4-H club members from urban areas.

2. The relationship between participation in specific 4-H activities and leadership life skill development should be investigated. Which activities and what level of participation contribute more to the development of leadership life skills?

3. Non-4-H activities should be investigated to determine what qualities/ activities enhance leadership life skill development.

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ANALYSIS OF 4-H PARTICIPATION AND LEADERSHIP LIFE SKILL DEVELOPMENT IN TEXAS 4-H CLUB MEMBERS

A Critique

Alfred J. Mannebach, University of Connecticut--Discussant

The introduction sets the stage for the study and helps the reader to become oriented to the problem. An excellent rationale, which leads into the problem statement is presented. The authors point out a deficiency in previous research studies, namely, the lack of a comparison group, and show how the current study sought to rectify the current situation and answer additional questions.

The objectives of the study are clearly stated. The authors have conducted a comprehensive study into five major areas. Sound research methodology was used. Not only did they randomly select counties for study, they randomly selected the 4-H members studied. Although they sampled intact classes, the classes were randomly selected from randomly selected schools. A pilot test was conducted to determine face validity and to assess internal reliability. Response choices to the six point Likert-type scale were identified. Results are presented clearly and conclusions and recommendations are supported by the data presented. The results show that 4-H participation contributes to important life skill development areas which coincide nicely with the foundation skills and workplace competencies presented in the recent SCANS report published by the U.S. Department of Labor.

One question I have about the study is the possibility that because intact classes were used for the non-4-H sample, might some 4-H members have been part of the students studied in the intact classes? If the possibility existed, how was it controlled in the analysis of the data? Another question I have concerns the instrument used. The authors state that statements were grouped into five measurement scales. How were the statements grouped? Was a factor analysis used to determine factor loadings and then factors named based on the groupings or were statements grouped by logic? More detail regarding instrument development would have been helpful.

A recommendation was made that the study be replicated with 4-H club members in urban areas. Because of the random nature of the study, I would have thought that urban members would have already been included in the study. If not represented, I commend the authors for making the recommendation. In summary, this study presents a strong case about the contribution that 4-H programs are making to member life skill development in Texas. I commend the authors on conducting a comprehensive and complex study. Results should be widely disseminated and made available to policy makers. I encourage them to continue study in the areas identified.

DRUG USE BY AGRICULTURAL EDUCATION STUDENTS

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INTRODUCTION

Drug use by school age youth has received increasing attention during the past decade (Palmer & Ringwalt, 1988). The 18th Annual Gallup Poll of Schools identified drug use by students to be the most important problem facing public schools (Gallup, 1986). This was a change from previous years, the 14th Annual Gallup Poll data indicated that student discipline was the number one concern (Gallup, 1982). The public's increased level of awareness about student drug use underscores its immense educational implications.

Drug use negatively impacts student learning in the classroom. Student drug use is especially harmful when the student is in an agricultural education setting. The use of mind-altering chemicals is dangerous in vocational education laboratories where power equipment is common (Erekson & Schultz, 1983). Consequently, management of students' drug use in agricultural education is critical for both student learning and safety. Teachers at a vocational school in Florida realized the importance of students being drug-free and implemented a drug-free program (Maready, 1990). The goal of the school's drug-free program was to convey to students that they had to be drug-free in order to get and retain jobs. This was done in part by placing a heavy emphasis on the safety aspects of being drug-free on the job.

Unfortunately, research that focuses on drug use by vocational education students is lacking. The majority of literature regarding student misbehaviors deals with more common discipline problems. Legacy (1982) studied classroom remedies of vocational teachers, administrators, vocational students, and student teachers for student discipline problems. Only two of the eighteen discipline situations that vocational teachers were asked about dealt with drugs. One situation concerned students that were "hungover" and the other dealt with students who were smoking in the bathroom.

Bowen and McCracken (1981) authored a handbook to assist vocational teachers in maintaining effective classroom and laboratory control. Of the 20 discipline situations described by the handbook, only two dealt with drugs. Alcohol and marijuana use was one situation. The other situation combined the use of smokeless tobacco with chewing bubble-gum.

Patton (1981) developed a student discipline model for use in the vocational classroom and laboratory. He also tried to identify the causes of discipline problems in vocational classrooms. Of the 50 factors considered by Patton (1981) to be the cause of disciplinary problems, not one factor was drug related. However, a national study of agricultural education (Camp & Garrison, 1983) identified the use of tobacco in any form as one of the 10 most serious student misbehaviors. Camp and Garrison (1983) found that agricultural teachers were having little or no problem with students using or selling hard drugs; however, teachers from larger schools perceived drug use to more serious than teachers from smaller schools.

PURPOSE AND RESEARCH QUESTIONS

Drug use in the United States is a major social concern. Ellickson & Bell (1990) noted that the use of these substances by adolescents poses substantial and specific harm to their health, development, and safety. The use of drugs by agricultural education students affects not only their education, but also the employers who hire them when they graduate. The lack of current research dealing with agricultural education student drug use gives rise to several questions. Are agricultural education students more or less likely to experiment with drugs than non-agricultural students? Are agricultural students more or less likely to be current users of drugs than non-agricultural students? The purposes of this study are to determine drug use among agricultural students and to define differences in drug use between agricultural and non-agricultural students. The following research questions were used to guide this study:

1. Do agricultural education students and non-agricultural education students differ in their lifetime (experimental) use of gateway drugs (tobacco, alcohol, and marijuana)?

2. Do agricultural education students and non-agricultural education students differ in their lifetime use of hard drugs (cocaine, hallucinogens, uppers, downers, inhalants, steroids)?

3. Do agricultural education students and non-agricultural education students differ in their 30-day (current) use of gateway drugs?

4. Do agricultural education students and non-agricultural education students differ in their 30-day use of hard drugs?

PROCEDURES AND DATA ANALYSIS

The population for this study was all 9th through 12th grade students in North Carolina Public Schools during the 1990-1991 school year. The data for this study was derived from a representative sample of 10,883 7th through 12th grade students in North Carolina surveyed in the winter of 1991 by the Alcohol and Drug Defense Section and the Division of Development Services of the North Carolina Department of Public Instruction. A non-proportionate, stratified cluster, random sampling plan was used to select students to be surveyed. The population was stratified both by grade groupings (7th-8th grades, 9th-10th grades; 11th-12th grades), and by the state's eight educational administrative regions. The data reported here are limited to a sample of 6,781 9th through 12th graders since these are the grade levels at which agricultural education programs are offered.

Within each of the 24 cells resulting from the stratification, the sampling frame comprised of all schools with any 7th through 12th grade classes. Sampling clusters consisted of all students attending English classes at randomly selected schools. English classes were selected as the sampling cluster because all 7th through 12th grade students are required to take English. Altogether, 72 classes were surveyed within each of the eight regions. Because the eight regions varied considerably in student population, a weighting scheme was used to calculate accurate statewide results. Weights used were ratios of the population of 7th through 12th graders in each region to the total population of 7th through 12th graders statewide.

The questionnaire used was originally developed for use in Wake County, North Carolina by the Research Triangle Institute. This questionnaire was modified for the statewide studies and was tested in 1987 and 1989 for validity and reliability. The questionnaire used for this study was nearly identical to the 1989 study except for minor alterations to the responses in several of the questions. The surveys were anonymous and coded by region only. Students were informed prior to administration that completed instruments would be sealed and that no school official would see them. Teachers were asked to leave the classroom during the administration to further enhance the credibility of assurances of anonymity. Lifetime or experimental use was defined as use of a particular substance at least once during the student's lifetime. Thirty-day or current use was defined as use of a particular substance within 30 days of the survey.

Of the 134 local education agencies (LEAs) in the state at the time of the survey, 129 had at least one school selected, and 128 of those participated. One county declined to participate as the state study conflicted with a local substance use survey being administered by the LEA. The absence of this county is believed to have little impact on the weighted statewide results since the educational region in which the county is located has the lowest student population of any region in the state. The questionnaire was administered to 10,883 students in the 128 LEAs that participated. Thirty-five students refused to participate in the study resulting in 10,848 usable questionnaires (99.7%). The non-parametric chi square test was used to test for differences in drug use between agricultural and non-agricultural students. Only percentages were reported since actual frequencies would be nonsensical due to the weighting scheme used for these statewide results.

RESULTS

Males made up 49.4% of the sample, females 50.6%. Whites constituted 68.5% of the sample; African-Americans 26.3%; Native Americans 2.5%; and Asians and Hispanics both 0.8%. Students were characterized as agricultural students if they reported "that they were currently taking courses" in agricultural education. Of students in the sample, 8.7% were considered to be agricultural students.

Agricultural Students Lifetime Use of Drugs

In general, drug use by agricultural education students is similar to that of non-agricultural students (Table 1 & 2). Alcohol was the drug of choice among agricultural and non-agricultural students. Eight in ten students had tried alcohol at least once during their lifetime. A majority of students had also experimented with tobacco. Cigarettes were tried by two-thirds of agricultural as well as non-agricultural students. Over one-fourth of agricultural and non-agricultural students had also tried marijuana at least once during their lifetime. The proportion of agricultural and non-agricultural students that had tried hard drugs was lower than the percentage that had experimented with gateway drugs. However, approximately one-eighth of all students had tried uppers (i.e amphetamines), downers (i.e. barbiturates), and inhalants (i.e. glue) at least once during their lifetime.

Table 1. Lifetime Use of Gateway Drugs for Agricultural and Non-agricultural Students

Substance	Agricultural %	Non-agricultural %	Chi-Square
Cigarettes	66.4	61.5	0.6
Smokeless Tobacco	51.6	29.9	12.6***
Alcohol of any type	82.6	81.8	0.0
Beer	74.9	74.1	0.0
Regular Wine	58.5	56.7	0.1
Wine Coolers	70.1	70.1	0.0
Hard Liquor	57.9	52.1	0.8
Marijuana	34.4	27.8	1.3
Hashish	7.2	6.1	0.1

*** p<.001

Table 2. Lifetime Use of Other Selected Substances for Agricultural and Non-agricultural Students.

Substance	Agricultural %	Non-agricultural %	Chi-Square
Cocaine	7.1	4.8	0.7
Crack	2.2	2.0	0.0
LSD, PCP, & other hallucinogens	7.0	6.5	0.0
Uppers	18.7	15.8	0.4
Downers	12.6	9.3	0.7
Inhalants	14.4	13.1	0.1
Steroids	4.7	1.4	3.9*

* p<.05

There was a statistically significant difference in lifetime use of smokeless tobacco between agricultural and non-agricultural students. Over one out of two agricultural students (51.6%) had tried smokeless tobacco compared to less than one-third of non-agricultural students (29.9%) who had tried the drug. Agricultural students were also statistically more likely to have tried steroids than non-agricultural students. Nearly 1 out of 20 agricultural students (5%) had tried steroids at least once during their lifetime while 1 out of 100 non-agricultural students (1%) had tried this substance.

Agricultural Student 30-Day Use of Drugs

Current use of the drugs studied was similar among agricultural and non-agricultural students (Table 3 & 4). Alcohol was currently being used by approximately 4 out of 10 of agricultural and non-agricultural students. Nearly one-third of agricultural and non-agricultural students were also current users of cigarettes. One-eighth of all students had used marijuana within 30 days previous to the survey. There were statistically significant differences among agricultural and non-agricultural students in current use of smokeless tobacco and beer.

Table 3. 30-Day Use of Gateway Substances for Agricultural and Non-agricultural Students.

Substance	Agricultural %	Non-agricultural %	Chi-Square
Cigarettes	31.8	24.8	1.5
Smokeless Tobacco	24.5	7.7	19.8***
Alcohol of any type	49.2	39.0	2.5
Beer	41.1	28.5	4.4*
Regular Wine	13.3	10.4	0.5
Wine Coolers	25.9	21.6	0.6
Hard Liquor	30.5	20.4	3.5
Marijuana	18.0	14.0	0.8
Hashish	3.7	1.8	1.0

*p<.05 ***p<.001

Agricultural students were statistically more likely to be current users of smokeless tobacco. Nearly one out of four agricultural students (24%) were currently using smokeless tobacco compared to one out of 20 non-agricultural students (8%). Agricultural students were also more likely to had used beer in the 30 days prior to the survey. Four out of ten agricultural students (41%) were current users of beer compared to one out of three non-agricultural students (29%).

Table 4. 30-Day Use of Other Selected Substances for Agricultural and Non-agricultural Students.

Substance	Agricultural %	Non-agricultural %	Chi-Square
Cocaine	3.0	1.3	1.1
Crack	0.9	0.8	0.0
LSD, PCP, & other hallucinogens	3.4	2.3	0.3
Uppers	7.9	5.8	0.5
Downers	5.6	3.3	0.9
Inhalants	5.5	3.2	0.9
Steroids	2.8	0.7	2.8

CONCLUSIONS AND/OR RECOMMENDATIONS

Agricultural and non-agricultural education students shared similar drug and alcohol use patterns. Agricultural and non-agricultural students use alcohol and other drugs in similar proportions. Although use of hard drugs is on the decline in the United States, the use of gateway drugs such as tobacco and alcohol are still significant problems among school age youth (NIDA, 1991). The percentage of agricultural and non-agricultural students in this study that had tried or were current users of tobacco, alcohol, and marijuana as well as other drugs was disturbingly high. The health and development of the students who take these drugs are affected as is their performance in the classroom. Which in turn impacts the education of all students.

Of special concern to agricultural educators is the use of drugs by students before or during school which adversely affects the safety of all students in agricultural laboratory settings. Agricultural teachers, as do all teachers, must be able to recognize alcohol and other drug use among their students so that unsafe conditions do not arise in the classroom and/or laboratory. Subsequently, teachers must help those students using drugs to take appropriate steps to stop. Consequently, agricultural education teachers need in-service training in drug prevention and intervention strategies like any other teacher in the school. Prevention training is important for agriculture teachers to help prevent students from experimenting with drugs, while intervention is crucial for the recognition and cessation of current drug use by students. Agricultural education state specialists and agricultural teacher educators should make sure that pre-service and in-service agricultural teachers are receiving drug prevention and intervention training.

The high use of smokeless tobacco among agricultural students is alarming. This result supports the conclusion of Camp and Garrison (1983) that tobacco use is one of the ten most serious discipline problems in agricultural education. Research (Edwards, Glover, & Schroeder, 1987) has shown that the use of smokeless tobacco has severe health implications for the user. Enrollment in agricultural education tends to be dominated by males. Glover, Edmundson, Edwards, and Schroeder (1986) argued that the resurgence in the popularity of smokeless tobacco is linked to advertising campaigns that convey the image of a smokeless tobacco user as "macho" or "manly". Agricultural education teachers must take steps to ensure that smokeless tobacco use is discouraged. Smokeless tobacco use by students and teachers should not be condoned, especially during school activities. Research among high school student athletes (Wisniewski, Mohl, Shedroff, 1990) has found that smokeless tobacco use by the players is related to their coaches use of this drug. Perhaps a similar relationship exists between agricultural students and agricultural teachers. More research is needed to explore the reasons why smokeless tobacco use is so prevalent in agricultural education. Additional research is also needed to determine why a greater percentage of agricultural students experiment with steroids.

Additionally, agricultural education teachers should integrate drug prevention lessons into their existing programs to help support other prevention efforts being conducted in their school system and community. Also, the FFA at the state and national level should incorporate drug prevention strategies into local, state, and national FFA leadership activities. There are many common goals between existing drug prevention curriculum and the FFA. For example, existing drug prevention programs such as Drug Abuse Resistance Eduction (D.A.R.E) and the FFA emphasize increasing self-esteem and decision making skills in students. Common goals, such as these, provide logical starting points for joint prevention efforts between agricultural educators and drug education specialists. Furthermore, there is a need for additional research to determine if there is a difference in drug use between FFA members and non-members.

Finally, agriculture teachers (and all teachers) should model drug-free behavior by not using these substances, especially in front of their students. Agricultural teachers who carry smokeless tobacco in their back pocket, where it is plainly visible to all students, set a negative example for students to emulate. The battle against drugs will only be won with cooperation among everyone in the school and community.

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DRUG USE BY AGRICULTURAL EDUCATION STUDENTS

A Critique

Alfred J. Mannebach, University of Connecticut--Discussant

The author is to be commended for studying "the most important problem facing public schools" according to the 18th Annual Gallop Poll of Schools. Although we may be inclined to think that drug use affects someone else's children and that students under our direction and influence are not drug users or abusers, the data tell us a different story.

The need for the study was well grounded in the literature. The author pointed out that few studies regarding drug use had been conducted in vocational education in general and in agricultural education in particular. He pointed out that drug use is related to the larger issue of student discipline, that drug use is considered a most serious student behavior, and that teachers from larger schools perceive drug use to be more serious than teachers from smaller schools. The research questions are clearly stated. A definition of terms is presented. A large, representative sample was studied. The primary population of agriculture students, 9th through 12th graders, was included in the study. Results were presented clearly and conclusions and recommendations were made. The author is to be commended on the fine job done in discussing the findings and implications of the study.

It appears that the study was part of a larger, more comprehensive study of drug use in North Carolina. A statement indicating the relationship between this study and the purpose of the larger study, if conducted, would have been helpful. A more precise and detailed labeling of table titles would also improve the manuscript. Without reading the definitions of "lifetime use" and "30 day use" of drugs, imbedded in the manuscript, the reader may not understand the meanings of the terms. It is also suggested that the manuscript be proofread carefully as some words were missing and the author used "data was" periodically throughout the paper.

As mentioned previously, the author has discussed the results thoroughly. Implications for teachers and educational professionals are stated clearly. I liked the recommendation that a study be conducted to determine the use of drugs between FFA members and non-members. This study was primarily a study of the breadth or extent of drug use by agricultural education students in North Carolina. Further studies focusing on the intensity and duration of drug use and studies in other states or across the United States may be useful. More effective strategies to prevent drug use and abuse must be found. I commend the researcher for conducting this important study and I hope he continues research in this area which is recognized as a current and major societal problem affecting all of us.

COMPARISON OF DETERRENTS TO NONTRADITIONAL MALE AND FEMALE ENROLLMENT IN SECONDARY AGRICULTURAL EDUCATION PROGRAMS IN NEBRASKA

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INTRODUCTION

Who influences students' decisions to enroll in traditional and/or nontraditional programs? By the time children reach elementary school, they have already sensed the pressure to conform to society's expectations of sex-appropriate behavior and interests. Encouragement from parents to succeed in math, science and technology is critical in a girl's decision to enroll in these courses (Parsons, 1980). Beck (1989) contended that the greatest influence on anyone's (regardless of gender) career decision is the mother. Kotrilik and Harrison (1987) reported in their study that "for agricultural education students as well as other seniors, parents' influenced the students' career choices more than any other person, with the mother being more influential than the father." Guidance counselors had almost no impact on influencing students about what was taught in agricultural education programs (Luft and Giese, 1991).

Lillydahl (1986) previously addressed gender appropriate segregation phenomenon employing economic theory directed at demand side factors affecting female (male) entry into the job market. All of the demand side theories (discrimination theory, theory of statistical discrimination, crowding theory, internal labor market theory) arise from a subtle premise that females (males) are not first-consideration applicants for nontraditional employment opportunities. Conversely, considering the supply side of economic theory, women (men) accepting the demand premise of not being a first consideration application elect the more traditional employment opportunities. The continuation of the demand side theories contribute to occupational crowding and lower relative wages. The demand theory is steeped in cultural bias; the supply theory is a phenomenon of acceptance. Advances have been made in nontraditional enrollments but those women and men who enroll in nontraditional programs face a number of problems none of the least being "sex bias and stereotyping; harassment; lack of support by family, school personnel and peers; lack of guidance programs; lack of role models; and job placement." To continue to make strides in nontraditional enrollments in vocational courses, deterrents need to be addressed.

In a study conducted by Bell and Fritz (1992) females who had access to secondary agricultural education courses but chose not to enroll but who subsequently enrolled in the College of Agricultural Sciences and Natural Resources, University of Nebraska-Lincoln were surveyed to determine deterrents to their secondary agricultural education enrollment. Critical obstacles identified were: lack of career information explaining both traditional and nontraditional employment opportunities for females, a lack of counselor services providing awareness of nontraditional employment and career opportunities; a lack of an existing supportive network for participation in agricultural education courses; an agricultural education program delivery format not responsive to their needs; and difficulty in scheduling agricultural education courses. The majority of these deterrents were not gender-specific and could have been experienced by both males and females. Therefore, follow-up research was recommended to be conducted with a male audience paralleling the educational background of the female audience surveyed in the research to compare considerations influencing their decision to not enroll to determine if they were generalizable beyond gender.

PURPOSES AND OBJECTIVES

The purpose of this investigation was to identify and define deterrents to male enrollment in secondary agricultural education programs in Nebraska and compare and contrast the results to responses of females in a similar study conducted in Nebraska in Fall, 1990. The objectives of the study were:

1. To identify critical considerations made by male students which influenced their decision of whether to enroll in agricultural education classes.
2. To compare and contrast male and female responses regarding critical considerations which influenced their decision of whether to enroll in agricultural education classes.

PROCEDURES

Populations: The populations of this study were: 1. resident males who graduated from high schools offering agricultural education who were majoring in an area of study in the College of Agricultural Sciences and Natural Resources (CASNR), University of Nebraska-Lincoln and had not enrolled in agricultural classes at the high school level; and 2. resident females who graduated from high schools offering agricultural education who were majoring in an area of study in the CASNR, University of Nebraska-Lincoln and had not enrolled in agricultural classes at the high school level.

Group 1, males, had a population of 49, 36 responded for a response rate of 74%; group 2, females, had a population of 37, 30 responded for a response rate of 81%. The reliability for each group was .93 and .95, respectively.

The populations were identified by a confidential search of secondary transcripts found in files in the Dean's Office, CASNR. Because of the relatively small number, (Group 1, N=49 and Group 2, N=37), the total population was surveyed. High schools offering agricultural education programs were determined from an official agricultural education roster provided by the Nebraska Department of Education.

Instrumentation: Instrumentation was a questionnaire derived from a review of relevant literature and corresponded to the objectives of the female study. The instrument consisted of demographic questions and attitudinal questions related to courses, support networks, guidance, career awareness, facilities, others' perception of enrollment in agricultural classes and school policy. A four point Likert scale (1=strongly agree to 4= strongly disagree) was used for response to attitudinal questions.

The instrument was reviewed for content validity by a panel of experts including teacher educators, educational psychologists, graduate students, counselors, equity specialists and female college students.

Data Collection: A questionnaire package was mailed containing the coded survey, cover letter and stamped, return envelope. Initial follow-up of non-respondents was a phone call after two weeks. A second completed package was mailed to those who had misplaced or not received the first package.

ANALYSIS OF DATA

Data was analyzed using the SPSSX program. Early and late respondents were compared with no significant difference found in their responses. Means, standard deviations and t-probabilities were run comparing the two populations.

RESULTS

Data was reviewed regarding critical considerations made by college males and the degree to which considerations influenced their decision to not enroll in agricultural education courses. It was observed that no considerations were identified by the respondents as "strongly agreeing" (1.5 rating or lower on a 4 point Likert scale) to their influence. They did agree to a lesser extent (score of 1.5 to 2.5) on the influence two considerations made on their decision to not enroll in agricultural education courses. The remaining seventeen items they disagreed influenced their decision to not enroll (score of 2.6 to 4.0).

Male students agreed the following were considerations that influenced their decision to not enroll in secondary agricultural education courses:

*Lack of career information explaining opportunities in the agricultural industry; and

*School counselor provided no guidance about the high school agricultural program.

Data was compared regarding critical considerations made by college males and females and the degree to which there was significant difference (.10 level) or agreement (.90 level) between responses by gender. One item was identified at the .10 (difference) level and three items were at the .90 (agreement) level.

Males disagreed to a lesser extent than females about the counselor advising them not to enroll. Males and females in this study significantly agreed on the following critical considerations:

*Friends (peers) were not a primary influence in their decision not to enroll in agricultural education courses;

*Agricultural education instructors were not a primary influence in their decision not to enroll in agricultural courses; and

*Mothers would have supported their decision to enroll.

Table 1

Comparisons of Male and Female Responses to Degree to Which Considerations Influenced Decisions to Not Enroll in Secondary Agricultural Education Courses.

Item	Gender	N	MN	SD	T-Prob.
There was a lack of career information explaining opportunities in the agricultural industry.	Male	30	2.33	1.12	
	Female	30	2.03	.93	.26
The school counselor provided no guidance about the high school agricultural	Male	30	2.47	1.01	
	Female	31	2.68	1.17	.45
You perceived that agricultural education course content was not relevant to current and future employment opportunities in the agricultural industry.	Male	31	2.58	.96	
	Female	29	2.66	1.14	.79
Agricultural education course content based on a year-long program (Ag I, II, III, & IV) including many different agricultural topics which was not responsive to your specific interest in agriculture.	Male	30	2.63	1.30	
	Female	27	2.96	1.29	.34
Agricultural education courses were not easily scheduled.	Male	29	2.79	1.08	
	Female	29	2.52	.87	.29
Course titles and descriptions of agricultural education classes did not accurately describe course content using gender-neutral language.	Male	29	2.97	1.09	
	Female	26	3.39	1.13	.17
The instructor of agricultural education	Male	29	3.00	1.25	

provided no guidance about the high school agricultural education program.	Female	29	2.76	1.19	.45
The agricultural education teacher lacked professional appearance and/or conduct.	Male Female	30 29	3.00 3.03	.99 1.00	.30
You chose not to enroll in agricultural courses primarily because of the influence from your friends (peers).	Male Female	28 29	3.14 3.14	1.15 1.25	.99
A lack of a successful male/female role model in the agricultural career in which you were interested.	Male Female	30 30	3.20 3.13	1.22 1.28	.84
Males/Females already enrolled or having completed the agricultural education course or program influenced your decision.	Male Female	29 28	3.24 3.00	1.06 .98	.38
The school counselor advised you not to enroll.	Male Female	30 26	3.27 3.77	.94 .71	.03
You chose not to enroll in agricultural courses primarily because of the influence from your school counselor.	Male Female	28 26	3.32 3.62	1.06 .90	.28
You chose not to enroll in agricultural courses primarily because of the influence from your mother.	Male Female	28 28	3.36 3.71	1.13 1.08	.23
You chose not to enroll in agricultural courses primarily because of the influence from your agricultural education instructor.	Male Female	27 27	3.41 3.37	.97 1.21	.90
A "close" friend did not support your enrollment in agricultural education.	Male Female	29 28	3.45 3.50	1.09 .88	.85
Your mother did not support your decision to enroll.	Male Female	30 29	3.47 3.48	.86 .83	.94
You chose not to enroll in agricultural courses primarily because of the influence from your father.	Male Female	27 28	3.56 3.86	1.12 .93	.28

Your father did not support your decision to.enroll.	Male	29	3.66	.86	
	Female	29	3.59	.73	.74
The instructor of agricultural education advised you not to enroll.	Male	28	3.68	.72	
	Female	27	3.74	.66	.74

NOTE: MN = Mean, calculated from a scale of 1 = Strongly Agree to 4 = Strongly Disagree, Disagree, herein, defined as 2.6-4.0
SD = Standard Deviation
T-Prob. = T-Probability

CONCLUSIONS AND/OR RECOMMENDATIONS

The following conclusions were drawn from the findings of this study: Males (considered traditional student population for agricultural education courses) who did not have agricultural education courses in secondary schools where they were available but chose to enroll in a college of agriculture felt they lacked career information explaining career opportunities in the agricultural industry.

The literature (Beck, 1989) suggests lack of career information is a deterrent to nontraditional student enrollment. The results of the male study would indicate lack of career information transcends the nontraditional/ traditional boundary and is a problem for all students.

Male students indicated the school counselor provided no guidance about the high school agricultural program. Guidance counselors were deemed by Luft and Giese (1991) as having almost no impact on influencing students about what was taught in agricultural education programs. Perhaps because of the guidance counselors' necessary "non-partisan" stance, they do not provide guidance about any specific program. Or, perhaps, they do not provide information about agricultural education courses to students they have identified as "college bound".

Males indicated stronger disagreement than females when responding to "the school counselor advised them not to enroll". Males met with less discouragement then females. Lillydahl's (1986) research would support this conclusion. Counseling is either consciously or unconsciously influenced by the perception of "gender appropriate" occupational roles and is a phenomenon of acceptance.

Comparisons in this study between males and females indicate significant agreement friends (peers) and agricultural education instructors were not primary influencers in their decision not to enroll in agricultural courses. The mother was the primary influencer of agricultural education career choices among students in a study done by Kotrilik and Harrison (1987). The males and females in this study indicated that their mother would have supported their decision to enroll and was not a primary influencer in their choice not to enroll.

The following recommendations are made as a result of this study:

All students, regardless of gender, need more career information explaining career opportunities in the agricultural industry. The career information should be genderless and should be progressive, addressing traditional and emerging careers. It should contain information about education requirements and salary ranges. Additionally, it should be reinforced by networking with former students pursuing post-secondary education and potential role models.

Because of the politically sensitive nature of a guidance counselor marketing one program over another, agricultural education instructors should meet and provide counselors with concise, clear, genderless course descriptions in flyer or brochure format students may pick-up. The descriptions should indicate the relevance of the course to them, the essence of the course objectives and indicate career areas within agricultural industry that are related to the course content.

The perception secondary agricultural education programs are designed to be terminal education needs to be addressed. Efforts need to be made in agricultural programs to relate curriculum to majors and careers that require additional education beyond high school. Secondary instructors should encourage recruiters from post-secondary institutions to speak to all their classes. Instructors and recruiters should meet with guidance counselors to discuss benefits of secondary agricultural education linkages for students pursuing post-secondary education in an applied science area.

Students need to be advised, regardless of gender, to enter into programs in which they indicate an interest. Opportunities such as a junior high exploratory course using the discovery learning method could expose students to the range of possibilities agriculture could hold for them.

If students indicate they are not being influenced by instructors, counselors, friends (peers), mothers, fathers, just who is influencing their decision not to enroll in agricultural education? The only possible influencer may be themselves. In the aggregate, students are making decisions based upon the knowledge they have at hand. The study would indicate the knowledge is incomplete and students are not receiving assistance in making the decision. For this reason, it is important the agricultural education instructor provide the student with as many tools as they can to aid the student, male or female, in the decision to enroll.

The critical considerations of traditional and nontraditional students to enroll in agricultural education are more alike than they are different. Studies that have sampled a single-sex population should be replicated to determine if results are indicative of gender or occur in the general population.

Because of the limiting nature of the quantitative study method, it is recommended a qualitative study be conducted with students from the population to obtain rich detail regarding their decisions not to enroll in agricultural education at the secondary level.

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COMPARISON OF DETERRENTS TO NONTRADITIONAL MALE AND FEMALE ENROLLMENT IN SECONDARY AGRICULTURAL EDUCATION PROGRAMS IN NEBRASKA

A Critique

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The authors of this research study are to be commended for several reasons. First, they have studied a topic of importance, namely that of enrollment and gender equity. Second, they have identified deterrents to enrollment in agricultural education programs for both males and females. Third, they have made recommendations which have implications for enrollment of traditional and non-traditional students in agricultural education programs in the future.

The need for the study was well documented. A specific population was identified and defined for the study. The researchers were persistent in attaining a respectable response rate by using three attempts to obtain the data. The data were presented clearly in table form and relevant conclusions and recommendations were presented.

There is some confusion regarding to whom the males in this study are being compared; females identified in this study or females identified in other studies. Reference is made to a 1992 study and a Fall, 1990 study of female students. Were two previous studies conducted, or were the dates listed incorrectly? If one study was conducted, how do the results of male and female deterrents found in this study compare? If two studies were conducted, a more thorough description of the procedures and results is needed. In any case, a more thorough proofreading of the paper is warranted. Non-parallel construction of sentences was noted, some sentences lacked meaning, "then" was incorrectly used for "than", and the authors used "data was" several times in the paper.

Most of the items in the instrument were negatively worded items. Respondents tended to disagree with many of the items, thus providing a double negative response which was difficult to understand. It may have been more appropriate to state the items in a positive manner and let the students respond accordingly. Another question concerns the inventory of items listed on the instrument. Perhaps a preliminary study on why students who did have access to agriculture education programs in high school and who did enroll in the College would have identified additional reasons for or deterrents to enrollment in agricultural education programs. The suggestion made by the authors that further study of this important issue be conducted is to be commended.

THE FOREST INDUSTRY IN THE 21ST CENTURY: A DELPHI STUDY WITH IMPLICATIONS FOR AGRICULTURAL EDUCATION PROGRAMS

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INTRODUCTION

No one knows for sure what the work environment of the next century will be like, but it will certainly be characterized by rapid, continuous change. If vocational education curriculum is merely based on the past or present, the graduates cannot be expected to be prepared for the future. Since the Ouija board cannot be relied upon to predict the future, agricultural educators must use futuristic research techniques to update curriculum content. Ravitch (1983) stated that all educators, especially those involved in program planning, must use futuristic techniques.

Curriculum content must be kept up to date in the agricultural education/forestry area if these students are to be prepared for the jobs in the next century. Experts now agree that planning should be based on a futuristic model (Ravitch, 1983; Cornish, 1987; Murphy, 1987). A futuristic strategy utilizing the Delphi technique may be needed to accomplish this goal. The Delphi technique has been used in government, industry, medicine, regional planning, and education for a variety of situations including futures forecasting, curriculum planning, program planning, policy formation and problem identification and solutions (Flanders, 1988).

The forest industry is changing rapidly, yet little research was found concerning futures research in the forestry area. No futures research was found that had specific implications for forestry curriculum content in agricultural education.

PURPOSE AND OBJECTIVES

The purpose of this research was to determine the characteristics of the forest industry in the year 2000 in order to recommend content for agricultural programs of the future.

Specific objectives were to determine:

(1) the general characteristics of the forest industry in the year 2000.
(2) a demographic profile of opinion leaders in the forest industry.
(3) if the Delphi technique could be used to achieve consensus among forestry experts concerning the future of the industry.
(4) the work force requirements of the forest industry and the educational requirements of those employed in the forest industry in the year 2000.
(5) the agricultural education curriculum content needs for forestry course work in the year 2000.

PROCEDURES

This was a national futures study utilizing a modified Delphi technique. Collection of data consisted of four phases: instrument development, selection of a panel of experts, an initial round, and a final round of the Delphi.

The Delphi survey instrument consisting of 85 items on a five point Likert-type scale was developed from forestry literature dealing with predictions of future directions of the industry. Over 300 statements were taken from journal and professional magazine articles and research reports. A draft of the instrument was reviewed by a panel of 12 persons who had expertise in the forestry field, in futures research, and/or in education. The panel evaluated the items for importance and reviewed the instrument for content and face validity. Because of the small N it was not possible to perform a test for reliability.

The top 33 experts in the forest industry nationwide were selected to participate through a national nomination process. Nominators were participants at the 1990 Society of American Foresters Annual Meeting held in July, 1990, executive secretaries from state forestry associations, and from state foresters. Thirty-one of the 33 most frequently nominated experts agreed to serve on the panel. The 31 experts were geographically dispersed across the United States (Figure 1).

ANALYSIS OF DATA

Statistics used to analyze the data included count, composite score, means, percentages, medians, standard deviations, interquartile ranges, and Pearson product-moment correlation coefficients. Stability of responses between rounds, group agreement, and item ranking were determined using these statistics.

RESULTS

When asked to indicate the category that best described their current affiliation with the forest industry, 8 or 26% of the 31 members of the panel indicated they were state foresters, 5 were consultants, 5 were educators, 3 were federal employees, 3 were private industry employees, 3 were on the staff or an officer of a professional association, 3 were researchers, and 1 indicated that he was a political forester. Twenty nine of the 31 experts participating in the study were males and 2 were females. They were all well-educated with 12 having bachelor's degrees, 6 having master's degrees, and 13 having doctorate degrees. The group had a total of 855 years with a mean of 27.5 years of experience in forestry. Respondents ranged in age from 37 to 72 years of age with a mean of 51.7 years. A description of the experts is not necessary for the interpretation of the results of the Delphi, but this information may be important in the selection of groups for further study.

The standard deviations and interquartile ranges indicated that the central tendency was a movement toward consensus. Standard deviations tended to decrease around the mean (91%) and interquartile ranges tended to decrease or stay the same from round one to two (98%), becoming closer to the median. The responses were found to be very stable from round 1 to round 2 in 83 or 98% of the items as indicated

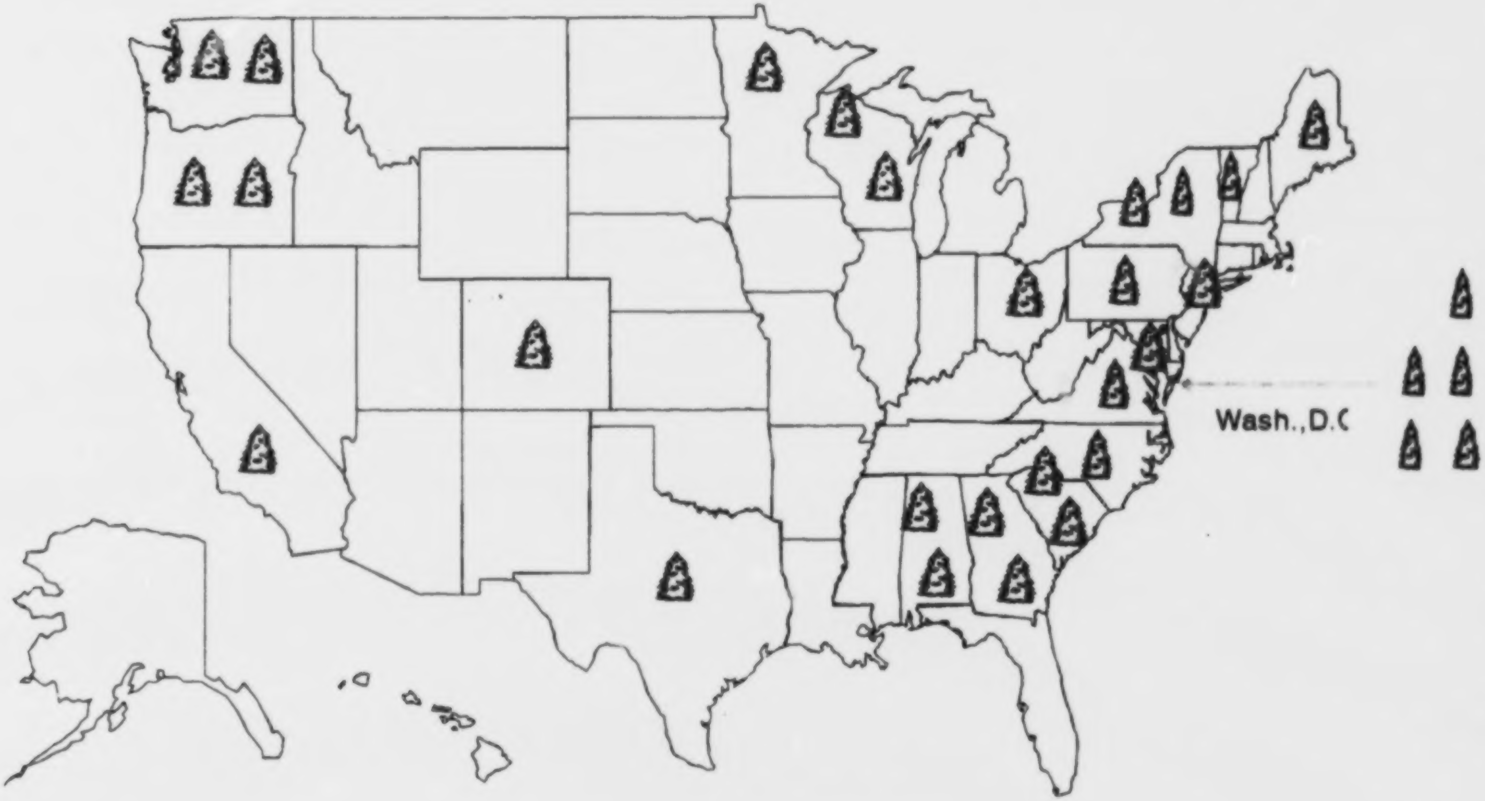

Figure 1 Location of the panel of experts.

▲ = one panel member.

by the Pearson product-moment correlation coefficient procedure (Cohen, 1988).

A composite score was calculated on round two data for each item and used to rank the items in order of agreement. The highest ranked items dealt with conservation education for forest resource users and practitioners, environmental restrictions, emerging new technologies, and changing demographics. The items ranked lowest (indicating disagreement) were concerned with salaries, recycling, federal support for forestry research, forest technicians, a national forest practice act, exports, tropical plantations, preservation, and clearcutting. Those findings are presented in Table 1. Respondents made a total of 766 explanatory comments -- 451 in round 1 and 315 in round 2.

Table 1: Items of Highest and Lowest Rank by Composite Score

Number	Item	Composite Score	Rank Order
Highest Ranked Items			
30.	The demand will be greater for well trained employees with good communications and personal relations skills	141	1
6.	Clearcutting will be utilized less as a forest management tool on public forestlands	137	2
24.	Smoke management restrictions will become more stringent as concerns about air quality become stronger	133	3
78.	Geographic Information Systems (GIS) and remote sensing technologies will be used more to provide the information needed to make decisions on complex resource management objectives	133	4
16.	The large number of poorly informed segments of the population, e.g., minorities, immigrants, urban dwellers, etc., will increase the need for education of forest resource users	130	5
77.	Field computers will be developed that can communicate interactively with the home office via satellite	130	6
37.	More conservation education will take place at all levels of our society, beginning with elementary schools	129	7
85.	Remotely sensed imagery from satellites will be increasingly used for predictions of growth, yield, and ecosystem and global change	128	8
15.	The projected population increase to 275 million will place a tremendous burden upon our forest resources	127	9
50.	Primary wood processors will become more conscious of the effects of their residues on the environment	127	10
Lowest Ranked Items			
36.	Salaries in forestry jobs will be competitive with other professions	87	76
52.	Accelerated wastepaper recycling will offset future demand growth for softwood pulpwood more than it will for hardwood pulpwood	86	77
81.	Federal support for forestry research will continue to decline	86	78
32.	There will be a shortage of forest technicians	82	79
25.	A national law prescribing forestry practices will be enacted because of growing concerns of the urban population about protection of non-timber values	81	80
59.	Most of the wood products exported from the U.S. will continue to be in the form of raw wood products	80	81
56.	Tropical plantations will pose a serious threat to the U.S. forest products industry	78	82
2.	Foresters, who have long embraced Aldo Leopold's philosophy of conservation, will lean more toward John Muir's philosophy of preservation	77	83
31.	There will be a shortage of foresters with four year degrees	77	84
7.	Clearcutting will be utilized more as a forest management tool on privately-owned forestlands	71	85

Consensus was indicated on an item if (a) at least 60% of the respondents were in agreement and (b) the composite score was less than 77.5 or greater than 108.5 -- that is, the composite score fell into either the agree or disagree range (Hill & Fowles, 1975). Thirty items (35%) did not meet the criteria for consensus. Of the 55 items on which consensus was reached, 4 items (7%) were in the "disagree" range and 51 items (93%) were in the "agree" range.

CONCLUSIONS AND RECOMMENDATIONS

It was concluded that:

1. The forest industry will grow and change rapidly into the 21st century with increasing emphasis on protecting the environment. Changing demographics will dictate increasing conservation education starting in elementary schools. Emerging new technologies will require that vocational education in forestry be continually kept up to date.
2. Opinion leaders in the forest industry were high-level managers with 26% being in control of the respective state's forestry agency. All of the experts were well educated with 13 of them having the Ph.D. degree in forestry. Opinion leaders in the forest industry can best determine content for forestry programs of the future.
3. The Delphi technique was effective in determining consensus among forestry experts regarding future characteristics of the industry, and program focus for the year 2000 could be recommended based on the consensus of experts. Two rounds are adequate in a Delphi study when a structured instrument is utilized.
4. There will be increased employment opportunities and a corresponding need for training programs in forestry.
5. There is a need to continually update the forestry curriculum in agricultural education programs. Forest industry leaders should be used as resource people in the development and updating of curricula. Industry certification programs should also be used in developing and updating curricula in forestry.

Thirty essential content areas are recommended for inclusion in Agricultural Education as follows:

Education of resource users
Effective communications
Environmental concerns
Developing leadership skills
Geographic Information Systems
Changing demographics
Field computers
Yield predictions
Global change
Biological pest control
Industry certification programs
Genetic engineering
Personal relations
State and federal regulations
Water conservation
Managing natural resources
Marketing forest products
Employment seeking skills
Conservation education
Remote sensing technologies
Global markets
Growth predictions
Ecosystem change
Recycling
Integrated pest management
Plant identification
Public relations
Problem solving
Computers in forestry
Social skills

Forestry course work in Agricultural Education should be emphasized and expanded. Preservice programs should include forestry courses. Inservice workshops for teachers should utilize forest industry personnel.

Major changes in the curriculum for forestry instruction are needed. The forest industry will need well-trained workers in the future. Vocational educators can have a decisive role in the future of the industry if futuristic curriculum, faculty, and facilities are utilized.

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THE FOREST INDUSTRY IN THE 21ST CENTURY: A DELPHI STUDY WITH IMPLICATIONS FOR AGRICULTURAL EDUCATION PROGRAMS

A Critique

Michael K. Swan, North Dakota State University--Discussant

First, I would like to commend the authors for their research study on the forest industry. Identifying the characteristics of the forest industry in the year 2000 is a tall undertaking.

The design of this futuristic research study was developed in a concise and appropriate manner. I found that the theoretical base was limited in its development. The purpose and objectives of the study were clearly stated. The procedures for gathering the data were appropriate for this Delphi design.

The instrument development was very sketchy and lacked a research base reference. The instrument lacked a reported reliability level and, according to Borg, (1987), we have to assume the reliability of this instrument to be low at best. The analysis of data was appropriate for the research reported. The results of the study were reported in an easy to understand format.

In reviewing this research study, the following questions are offered to the authors for consideration:

1. The study results seem to be very slanted toward the eastern portion of the country. This study will have very little if any impact of forestry curriculum in the western parts of the nation.
2. How were the 30 essential contest areas identified from the study? No results were presented to justify this listing.

TEACHER PERCEPTIONS OF AGRISCIENCE AND NATURAL RESOURCES CURRICULUM

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INTRODUCTION

The past decade has seen many calls for educational reform in the United States. Parents, teachers, business leaders, and educational professionals have all called for new and innovative approaches to teaching English, mathematics, and science. Agricultural education in the United States is responding to this need by placing more emphasis on teaching scientific principles using agricultural and natural resources concepts. The National Research Council (1988) in its report, "Understanding Agriculture: New Directions for Education" stated, "Teaching science through agriculture would incorporate more agriculture into curricula, while more effectively teaching science." Michigan agricultural education programs addressed this issue by replacing the production agriculture curriculum with a new agriscience and natural resources curriculum.

Moss (1984) studied agricultural education programs in North Carolina and found, "twenty-four (24) of the 60 competencies in the Introduction to Agriculture/Natural Resources course were identified as being similar to competencies taught in high school courses such as Biology, Earth Science, and Physical Science." In Michigan, the Michigan Agriscience and Natural Resources (ANR) Curriculum was cross referenced with the State Science Objectives as determined by the Michigan Department of Education (State Administrative Board, 1990). All objectives of the Michigan ANR curriculum matched objectives of the State Science Objectives.

Teacher attitudes about the new agriscience and natural resources curriculum are important to the success of the implementation process. Pepple (1982) studied factors associated with teacher use and effectiveness of the Illinois Rural Core Curriculum in Agriculture. The study found that the core curriculum influenced teachers to use a greater variety of classroom instructional methods (Pepple, 1982). Norris and Briers (1989) reported:

> Teachers' perceptions toward the change process (need for the change, manner in which the change was managed, amount of teacher input into the change, etc.) was the single best indicator of teachers' free choices and actual decisions concerning adoption of the change.

Peasley and Henderson (1991) conducted a descriptive study of teacher use, attitudes, and knowledge of agriscience curriculum in Ohio. Peasley and Henderson found 25% of the teachers were teaching more than 75% of the content objectives of the Ohio agriscience curriculum. This result led the researchers to state, "High school teachers of production agriculture in Ohio are teaching a moderate level of the agriscience content." However, the researchers concluded that "Ohio high school teachers of production agriculture could be described as having a positive attitude toward the notion of an agriscience core curriculum and the term agriscience (Peasley and Henderson, 1991)."

PURPOSE AND OBJECTIVES

This survey was conducted to determine use and perceptions of the Michigan Agriscience and Natural Resources Curriculum by Michigan agriscience and natural resources (ANR) teachers. The specific objectives of the study were to:

1. Determine the amount of the Michigan ANR Curriculum that is being taught by Michigan ANR teachers.
2. Determine Michigan agriscience and natural resources teachers' attitudes towards the concept of agriscience.
3. Determine Michigan agriscience and natural resources teachers' attitudes towards the Michigan Agriscience and Natural Resources Curriculum.

PROCEDURES

The research design for this study was a descriptive survey design. The survey instrument included four parts. Part I contained 70 objectives form the Michigan Agriscience and Natural Resources Curriculum. Teachers responded "yes" if they taught the objective, and "no" if they did not teach the objective in their agriscience and natural resources courses. Part II contained 13 questions pertaining to teachers' attitudes about the concept of "agriscience." The 13 questions used a seven level semantic differential scale ranging from 1 (strong negative attitude) to 7 (strong positive attitude). Part III contained 11 Likert scale questions about the Michigan Agriscience and Natural Resources Curriculum. Part IV contained 10 true/false questions about the curriculum.

Survey validity was established by a panel of experts that included faculty from the Department of Agricultural and Extension Education and Michigan agriscience and natural resources teachers. Reliability was established by a pilot test with a select group of Michigan ANR teachers. Reliability coefficients ranged from .72 to .95.

The survey was a census of all Michigan agriscience and natural resources teachers during the 1991-92 school year. Frame error was controlled by verifying the list with teacher educators in the Department of Agricultural and Extension Education at Michigan State University and the state supervisor for agricultural education at the Michigan Department of Education. The Total Design Method (TDM) (Dillman, 1978) was utilized for the study. A mail questionnaire was used to collect the data. The initial mailing was followed one week later by a postcard reminder. Second and third mailings, including replacement questionnaires, were made to all non-respondents. Early and late respondents were compared to ensure generalizability of the results to the target population. No differences were found between the early and late respondents.

ANALYSIS OF DATA

Data were analyzed using the Statistical Package for the Social Sciences (SPSS/PC+). Frequencies, means, standard deviations, semi-partial regression, and multiple regression analyses were used to analyze the data. Alpha was set *a priori* at .05.

RESULTS

The objectives that were listed in the questionnaire were from Units 100, 200, and 300 of the Michigan ANR curriculum. These objectives were selected because they were cross-referenced with the State Science Objectives for Secondary Students as specified by the Michigan Department of Education.

Percentages were calculated separately for Michigan agriscience and natural resources educators (70 objectives) who teach Units 100, 200, and 300, and horticulture teachers (27 objectives) who teach Units 100 and 200 only. Table 1 lists the mean percentage of objectives taught, the standard deviation, minimum, maximum, and number of respondents.

Table 1

Percentage of Michigan Agriscience and Natural Resources Curriculum objectives taught

Group	Mean	S.D.	Min.	Max.
All Respondents (n=108)	82%	17%	0	100%
ANR teachers (n=80) (not including hort.)	83%	18%	0	100%
ANR teachers (n=28) (horticulture only)	79%	16%	44%	100%

The percentage of objectives taught was also placed into quartiles for reporting purposes. The largest percentage of all three groups taught between 75 and 100% of the curriculum objectives. Table 2 shows the number and percentage of respondents in each quartile.

Semi-partial regression of the percentage of science objectives taught on the independent variables found that both the demographic variables of the teachers, and ANR program variables to be significant. Table 3 shows the results of the semi-partial regression.

Table 2

Percentage of Michigan Agriscience and Natural Resources Curriculum objectives taught

Percent	ANR (except hort.)		ANR (hort. only)		All Teachers	
	N	%	N	%	N	%
1 - 25%	1	1.3	0	0.0	1	0.9
26 - 50%	3	3.8	3	10.7	6	5.6
51 - 75%	13	16.3	8	28.6	21	19.4
76- 100%	63	78.8	17	60.7	80	74.1
Totals	80	100.0	28	100.0	108	100.0

Table 3

Semi-partial regression coefficients for independent variable sets with percentage of science objectives taught by teachers

Variable Set	sR^2	F
Demographic variables	.56	5.27 *
Independent variables	.12	4.37 *
Total	.68	4.37 *

* $p < .05$

Multiple regression analysis found that schools located in towns or rural areas, and the hours of in-service workshops teachers had attended to be significant variables in the equation. Table 4 displays the results of the multiple regression.

Table 4

Multiple regression of the percentage of science objectives taught by teachers on their independent variables

Independent Variables	Beta (β)	t value
Intercept	.31	.45
Demographic variables		
Age	-.01	.14
Gender	-.08	.39
Urban schools	-.09	.60
Town schools	.41	.00 *
Rural schools	.26	.02 *
Years taught	.01	.12
Program variables		
Program restructured	-.00	.91
Hours of in-service	.00	.04 *
Restructuring committee	.16	.41
Science certification	.10	.57

* $p < .05$
$R^2 = .68$

Part II of the questionnaire included thirteen pairs of adjectives in a semantic differentiation scale. Michigan agriscience and natural resources teachers had a slightly positive attitude towards the concept of "agriscience." The mean score for all teachers on the semantic differential scale was 5.70 with a standard deviation of .97.

Teachers' perceptions of the agriscience and natural resources curriculum was measured on a five point Likert scale with rankings from 1 (strongly disagree) to 5 (strongly agree). The mean for all respondents was 4.18, with a standard deviation of .48. Respondents strongly agreed that ANR courses should receive high school science credit. Respondents disagreed that traditional production agriculture programs were better than agriscience and natural resources programs. Results of the Likert scale questions are located in Table 5.

Table 5

Statistics for Likert scale questions on teachers' perceptions of agriscience and natural resources

Question		Mean	S.D.	Descriptor
1.	An ANR program in high school will give students a solid base for a career in agriculture and natural resources.	4.38	.68	Agree
2.	An ANR course should be recommended to all high school students.	3.92	1.01	Agree
3.	High school science credit should be awarded for ANR courses.	4.73	.48	Strongly Agree
4.	My community supports the concept of agriscience and natural resources.	4.12	.83	Agree
5.	Teaching an ANR curriculum enables me to more effectively meet the needs of my students.	4.05	.86	Agree
6.	An ANR curriculum attracts a diverse group of students.	3.95	.98	Agree
7.	I am a supporter of the change to agriscience and natural resources programs.	4.29	.88	Agree
8.	I believe that traditional production agriculture programs are better than agriscience and natural resources programs.	2.06	.89	Disagree
9.	There is evidence to support the change to an ANR based curriculum.	4.11	.74	Agree
10.	An ANR program is appropriate for my community.	4.22	.74	Agree
11.	ANR programs should be placed in the science department of high schools.	3.99	1.04	Agree

Teacher knowledge of the Michigan Agriscience and Natural Resources Curriculum project was measured on a 10 question test. Teachers were instructed to read a statement about the Michigan ANR Curriculum and mark the statement true and false. Teachers received one point for each correct response. Results indicated that the teachers had a mean score of 6.43. The scores ranged from four to 10. The largest group of respondents had a score of six on the 10 point test. Only 6.5% of the teachers had a score of nine or higher.

Michigan agriscience and natural resources educators also provided comments pertaining to the Michigan Agriscience and Natural Resources Curriculum. Comments were placed into positive, negative, and general categories. A sample of educators' comments follows:

Positive Comments

"The idea of restructuring is great, however, there is FAR too much paper work to be done."

"The Content of the new curriculum is great, but I need help in actually effectively implementing the content into the everyday classroom."

Negative Comments

"1. Time. Time. Time 2. May need a booster shot to get restructuring program off the ground."

"The process is very lengthy and time consuming. I know it is useful and constructive to do an internal evaluation but there simply not enough hours in the day to get everything done. It seems to be alot of open pushing, needlessly. Simply, give me the curriculum and let me teach."

General Comments

"What will happen to the restructuring & implementation of the new curriculum now that university support people are gone? Have we been railroaded again?"

"* Agriscience is only as good as the instructor."

CONCLUSIONS

Based on the findings of this survey, the following conclusions were formed:

1. Michigan ANR teachers are teaching a large percentage of the objectives of the Michigan Agriscience and Natural Resources Curriculum. Over 78% of the Michigan agriscience and natural resources teachers and 60% of Michigan horticulture teachers cover at least 75% of the science objectives of the Michigan Agriscience and Natural Resources Curriculum.

2. Michigan agriscience and natural resources and horticulture teachers had a slightly positive attitude towards the concept of "agriscience." They agreed that the curriculum is useful and should be recommended to all high school students.

3. Michigan agriscience and natural resources teachers only had an average knowledge of the Michigan ANR curriculum development project activities.

4. There was no significant differences in the percent of ANR objectives taught between programs that have completed restructuring and those that have not completed restructuring.

RECOMMENDATIONS

1. In-service and technical update sessions should be planned to assist teachers with developing instructional lesson plans that incorporate more objectives of the Michigan ANR Curriculum.

2. Teachers should be encouraged to attend professional development training and incorporate more hands-on activities into the curriculum.

3. Greater emphasis needs to be placed on disseminating curriculum development information to all Michigan agriscience and natural resources teachers.

4. Results of this study should be reviewed by other states considering curriculum changes. Additional research is recommended that would determine the factors that effect the decision why programs chose to restructure to become agriscience and natural resources programs.

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TEACHER PERCEPTIONS OF AGRISCIENCE AND NATURAL RESOURCES CURRICULUM

A Critique

Michael K. Swan, North Dakota State University--Discussant

The authors should be commended for investigating one of the significant issues facing agricultural education today. The change from one curriculum to another has been the most talked about issues in agricultural education in recent years. The authors attempted to identify perceptions of Michigan agriscience teachers toward using the new science oriented curriculum.

The authors developed a strong theoretical framework for their research. Data collection and analysis were appropriate for the research. The procedures of the study were through and provided an excellent reference from which to draw sound conclusions. The strong reliability coefficient of the instrument, .72 to .95, should be noted.

The results were clearly written and delivered in an easy to understand fashion. The conclusions and recommendations were supported by the findings of this research study.

In reviewing this research study, the following questions are offered to the authors for consideration:

1. Are all those teachers studies in Michigan using only the Michigan agriscience curriculum materials, or are they using a variety of materials?
2. How do you plan to get the word out concerning the new curriculum materials so that more teachers will start using these materials?
3. If this study shows that no significant differences existed between Argiscience and Natural Resources curriculum objectives being taught by programs who have gone through restructuring and those who have not gone through restructuring, why then spend the time in restructuring programs?

FARMER PERCEPTIONS OF SOIL AND WATER CONSERVATION ISSUES: IMPLICATIONS TO AGRICULTURAL AND EXTENSION EDUCATION

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INTRODUCTION

The rapid transfer of technology has contributed to the expansion and success of American agriculture. Unfortunately, technology has contributed to many environmental problems while it has enhanced crop yields and increased agricultural prosperity (Francis, 1987; Freshwater Foundation, 1987).

Many concerns exist today in rural and urban sectors about the threat to natural resources because of the problems agricultural production practices are causing, i.e. use of chemicals affecting the quality of life (Padgitt, 1987; Hallberg, 1986; Baker, Kanwar & Austin, 1985). Through the use of chemical fertilizers, herbicides, and pesticides, farmers are able to produce a reliable source of affordably priced food, which has enhanced the quality of life for the urban consumer (Padgitt, 1987).

Across the corn belt, the average nitrogen application rate increased from 45 pounds per acre in 1965 to 143 pounds per acre in 1984, to meet the increased demand for corn yield (Hallberg, 1986). According to Madison and Brunette (1984), nitrates can react to form carcinogenic chemicals thought to be linked to human cancers. However, the risk of nitrate contamination is not yet fully understood. It is interesting to note that most wells in the corn belt have excessive amounts of nitrates (Hallberg, 1986).

Pesticides are used by farmers on over 90% of the corn and soybean fields in the Midwest (Freshwater Foundation, 1987). Most soybean and corn fields in that region received two pounds per acre of pesticide chemicals each year (Freshwater Foundation, 1987). Pesticides enter the groundwater through spills, poorly managed wells, improper disposal of wastes and containers, agricultural drainage wells, sinkholes, and leaching (Hallberg" 1986). Ultimately, groundwater is the only source of drinking water for 97% of the rural population in the United States. According to an Environmental Protection Agency report, 17 pesticides in low concentrations have been found in the groundwater of 23 states. The pesticide found most often was the corn herbicide, atrazine. The chronic long-term effects of this herbicide in drinking water are unknown (Freshwater Foundation, 1987; Hallberg, 1986). If there is a long term problem, we are only beginning the process of evaluating the effect.

In 1989, problems associated with water quality became a Presidential Initiative. Further initiatives were started when water quality was ranked as the number one priority for agriculture by the Joint Council on Food and Agricultural Sciences for research, extension, and higher education for fiscal year 1992 (USDA, 1991). Also the National Extension Committee for fiscal year 1993 identified water quality as the first priority.

Over the years, agricultural and extension educators helped farmers learn new production practices which ultimately contributed to the current environmental problems. Many practices were selected which helped the farmer compete economically but threatened the quality of the environment (Rasmussen, 1989). At the same time, many educators have worked hard to teach farmers how to reduce the magnitude of soil erosion and other environmental challenges. What role do educators have in addressing the issues of improved production practices and environmental protection? In analyzing these issues, a number of critical questions need to be addressed. Should farmers alter or reduce the application rates of nitrogen to protect groundwater? What factors influence decisions to use alternative farming methods (eg. tradition, cost/profit, commercial fertilizer tests, growers pride)? What role can agricultural and extension educators play in helping farmers make more informed decisions? What sources of information do farmers find useful when confronted with environmental issues? How should educational programs be planned? These questions, and the identification of the major environmental concerns of farmers, was the focus of this study.

PURPOSE AND OBJECTIVES

The purpose of this study was to identify the perceptions of farmers regarding selected soil and water conservation practices. A secondary purpose was to determine the implications of these perceptions to educational practice. Objectives of the study were to identify: 1) perceptions of farmers regarding the use of chemicals and reduced tillage practices, and 2) resources that farmers use in acquiring information about chemicals, pesticides, fertilizers, and tillage.

PROCEDURES

The study was the result of a need expressed by the Iowa Association of Soil Conservation District Commissioners. Cooperators in the study included the Department of Agricultural Education at Iowa State University, the President of the Iowa Association of Soil Conservation District Commissioners, the Iowa State Agricultural Stabilization Conservation Service (ASCS), Iowa Soil Conservation Service, soil conservation district commissioners, and Iowa farmers.

The population of the study consisted of all farmers in the state (109,367) as determined by the Agricultural Stabilization and Conservation Service (ASCS). A sample of 731 farmers was selected and it was stratified and proportioned by conservation district so as to have a representative group of respondents across the state. Each conservation district, which corresponds to a county, was represented based on its size and the number of farmers in each district. Some districts have many more farmers than others so an attempt was made to make sure that each district was proportionately represented.

The study used a descriptive design. A mailed questionnaire was used to collect the data. Various segments in the questionnaire had a Likert-type scale. One section of the questionnaire used open-ended questions to elicit responses from the participants regarding their perceptions of soil and water conservation practices. The survey instrument was developed based upon previous research conducted on this topic. Items were designed to assess perceptions regarding (a) issues in soil and water conservation, (b) educational techniques and program usefulness, and (c) the usefulness of various sources of information. Respondents were encouraged to give written comments on the questionnaire.

The instrument was refined through consultation with an advisory committee consisting of educators and soil conservation leaders. Post-hoc reliability tests using the Cronbach's alpha procedure estimated the reliability of the scales on the instrument. The composite reliability coefficient for the instrument was determined to be .84. The items were divided into five subgroup for analysis. The alpha coefficients for the subgroups ranged from .79 to .95.

A total of 432 usable responses were received and formed the basis for the analysis of data. There were two follow-up attempts to collect more survey questionnaires. These attempts were successful in acquiring sufficient data for analysis. However, farmers traditionally do not respond well to mailed questionnaires. A nearly 60% return rate was deemed appropriate for analysis of the data. In comparing respondents with non-respondents, no significant differences were found. Descriptive statistical procedures sub-program of the Statistical Package for the Social Sciences was used in analyzing and summarizing the data in this study (Norusis, 1983).

RESULTS

As indicated in Table 1, the perception item ranked first by the respondents was that farmers might have benefited from the Conservation Reserve Program (CRP) even though these farmers might have caused the soil erosion and water quality problems. Many farmers wrote comments on the questionnaire indicating that they would like to have farm program control at the local level. Farmers see what is occurring on their neighbor's fields. Thus, if it were left up to them, exemptions would be made on the local level to exclude individuals from the program.

(Insert Table 1 About Here)

The low ranking of items relating to banning atrazine and reducing nitrogen fertilizer use indicates dependence upon these substances. These findings support the literature (Hallberg, 1986) that reported farmers are so accustomed to using these substances that making production changes becomes more difficult as these practices become entrenched. The respondents indicated that they agreed to some extent that farmers apply too much fertilizer per acre. Responses from these farmers indicated they did not agree that the rules for the Food Security Act should be relaxed.

As a result of the 1987 water quality legislation in Iowa, pesticide containers must have warning labels to inform users of potential dangers and contamination possibilities. The respondents indicated they did not feel this was an effective method of conveying information. The rush of field work by farmers in a typical spring season provides them with little opportunity to read container labels.

The ratings of statements concerning reducing nitrogen fertilizer rates, pesticide use in conservation tillage and higher chemical application rates with reduced tillage systems indicated slight agreement with these concepts. However, the education and fairness issues were the primary concerns of the respondents.

As shown in Table 2 demonstrations (tours) and county meetings were the two highest rated items related to the process of diffusion of new information and technology. This interest was attributed to a sense of community participation and ownership. Based upon these findings, educational specialists should incorporate these two techniques into conservation program planning strategies. Magazines were ranked third. The fact that the respondents in this study selected field demonstrations and tours to be the most useful source of information appears to support the idea that farmers trust information from other farmers more than other sources of information. Radio and TV (video tapes) were among the lowest rated sources of useful information. Little has been done with these forms of media in the area of conservation education. On-farm consultation ranked the lowest source of information. This finding was somewhat surprising in view of what agricultural educators do with farmers regarding on-site instruction. As indicated by Korsching & Nowak (1983), this finding may be attributed to the lack of emphasis by educators in these consultations regarding conservation issues.

Table 2. Means and standard deviations by rank regarding the usefulness of selected dissemination techniques and programs according to the respondents* (N=432).

Rank	Dissemination techniques and programs	Mean	S.D.
1	Field demonstrations (tours)	4.18	0.83
2	County and local meetings	4.00	0.80
3	Magazines	3.85	0.86
4	Printed materials (brochures)	3.77	0.83
5	Trade shows and fairs	3.69	0.97
6	Visual materials (slides, photographs)	3.61	1.02
7	Other, i.g., discussions	3.59	1.15
8	Television programs (video tapes)	3.51	1.03
9	Radio	3 49	0 99
10	On-farm consultation	3.16	1.15

*Scale: 1=Of No Use At All; 2=Not Very Useful; 3=Uncertain; 4=Somewhat Useful; 5=Very Useful

The Soil Conservation Service was ranked as the most useful human resource for information (Table 3). University specialists and the county extension services were also useful sources for information. It was somewhat surprising that seed/fertilizer/chemical dealers were perceived to be the fourth most useful human resource for information relating to soil and water conservation. It could be conjectured that since many aspects of conservation tillage are dependent upon specific knowledge possessed by technical chemical specialists, the users of these systems rely heavily upon the retail distributor of pesticides for information concerning use and application. Neighbors and friends and soil conservation district commissioners were also considered useful sources of information. The respondents tended to be uncertain about the usefulness of vocational agriculture instructors as sources of soil and water conservation information. Teachers are not perceived to be experts in soil and water conservation but were considered to be helpful in finding sources of information.

Table 3. Means and standard deviations by rank regarding the usefulness of human resources according to the respondents* (N=432).

Rank	Human resources	Mean	S.D.
1	Soil Conservation Service	4.15	0.91
2	County Extension Service	3.98	0.98
3	Iowa State University Specialists	3.90	0.88
4	Local seed/chemical/fertilizer dealers	3.75	0.96
5	Neighbors and friends	3.71	0.87
6	Soil Conservation District Commissioners	3.54	0.95
7	Other, e.g., ASCS	3.41	1.08
8	Vocational Agriculture Instructors	3.27	1.02
9	Machinery dealers	2.94	1.01

*Scale: 1=Of No Use At All; 2=Not Very Useful; 3=Uncertain; 4=Somewhat Useful; 5=Very Useful.

Farmers freely responded to questions about their perceptions of soil and water conservation practices. The researchers collected more than 10 pages of data. The following selected comments are offered to provide an indication of the range of how farmers view these issues.

Respondent Comments:

> *Farmers who have practices good soil management are always penalized in programs such as CRP.*
>
> *We need plenty of education. We need more soil conservation.*
>
> *More research is needed to make no-till more economically consistent with other forms of crop production.*
>
> *I have been disappointed in how slow the universities have been in doing research on reduced chemical farming methods. It seems that most of the information available is from farmers and private sources.*
>
> *I believe there are many products on the market sold in grocery stores, hardware stores, and local stores that are much more hazardous to our groundwater than chemicals most farmers use very carefully.*
>
> *As a county soil commissioner, I find this new 1985 law unworkable and unfair, and until they can get some justice in the law, it isn't going to work.*
>
> *If we banned the use of all known or suspected ag. chemicals that are carcinogenic, we would not need a $20 billion farm program. We have seen the enemy, and he is us.*
>
> *Keep the government and environmental people from getting too much control. The local people and organizations try to help get conservation done.*
>
> *We must place an emphasis on water quality, which includes streams, rivers, and lakes as well as groundwater.*
>
> *Groundwater pollution is being overplayed at the present time. I do believe we need to seriously study this problem, however.*
>
> *I have been no-tilling since 1979. In a week moment last fall, I fall plowed some of my corn stalk ground; many people were saying many good things. I ended up with more weeds, more work, and unhappy that I had plowed.*
>
> *All nitrogen, herbicides, and pesticides should be banned. There were two hatches of pheasants this year, and they are all gone. There were a lot of them they sprayed for spider mites. I don't hunt, but I like wild animals.*
>
> *I would like to express my total displeasure in the proposed government involvement of the conservation and production practices on my farms.*
>
> *Many use too high of chemical and fertilizer rates unnecessarily. We need education, concern, help, and probably laws with steep penalties to keep all Americans from ruining, killing, pollution our most valuable resource.*

It is past the time to educate. We need to stop using chemicals to produce cheap food. Land use laws are the only way the loss of this country's greatest natural resources will stop.

They should outlaw pesticides completely.

The volume and nature of comments indicate that there is much concern about soil and water conservation issues with farmers. Through their comments, respondents also indicated that there are many problems associated with conservation policies, management practices, use and application of pesticides and the attitudes of farmers toward conservation issues.

CONCLUSIONS

The following conclusions were drawn from the findings of the study:

1. Groundwater and water quality issues seem to be of greater concern to farmers than soil conservation issues.

2. Field demonstrations and county meetings are useful techniques to use when presenting information about soil and water conservation issues.

3. Governmental agencies such as Soil Conservation Service, extension (county) and state university specialists are seen by farmers as the most useful sources of information regarding soil and water conservation issues.

4. Farmers believe improved communications and education are needed to ensure proper management of chemicals used in agriculture.

RECOMMENDATIONS

Based on the findings and conclusions of the study, and the related literature, the following recommendations were formulated:

1. Targeted and unbiased education regarding conservation and environmental issues should be incorporated into educational programs for farm, urban, and industry individuals and groups.

2. Agricultural educators should use field demonstration research plots and group learning techniques and strategies to facilitate the conservation education process.

3. Farmers, researchers, industry representatives and county education resources should collaborate to facilitate the conservation education process.

IMPLICATIONS TO AGRICULTURAL AND EXTENSION EDUCATION

If the 1990's is indeed the decade of the environment, then the results of this study provide some useful information as educators plan environmental education programs. More importantly, the role of agricultural education in the process of helping people manage and care for their environment becomes critical. The rapid transfer of technology requires responsible stewardship of the resources used to make technology not only appropriate but also safe (Francis, 1987; Freshwater Foundation, 1987). The goal is to promote a more sustainable environment for growth. Agricultural and extension education has a responsibility to not only help disseminate new technology related to environmental and conservation issues but also help ensure that appropriate delivery systems be used to enhance the utilization of the technology.

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Table 1. Rank of means and standard deviations regarding the level of agreement of respondents concerning perceptions about environmental issues* (N=432)

Rank	Item	Mean	S.D
1	Farmers have benefited from Conservation Reserve Program (CRP) even though they may have caused the problem.	4.37	0.82
2	Urban threat of chemicals is as great a threat as farm chemical use.	4.32	0.92
3	More precise, unbiased education is needed for agri-chemical management.	4.20	0.89
4	Improved communication and information about chemical management is needed.	4.16	0.91
5	Ground water contamination is a serious problem.	4.07	1.04
6	I know what I have to do in order to meet provisions of the Food Security Act.	3.98	1.09
7	Side dressing is an acceptable alternative practice to broadcasting.	3.96	1.10
8	Farmers should attend fertilizer management clinics to gain knowledge.	3.94	0.97
9	Chemicals pose a serious threat to groundwater.	3.91	1.11
10	Information about pesticide application would reduce risk of	3.87	0.98
11	Crop residue is adequate to control erosion on my farm at planting time.	3.85	0.98
12	Industry should provide training, for pesticide use.	3.79	1.08
13	Farmers apply too much nitrogen per acre.	3.57	1.31
14	Nitrogen fertilizer rates should be reduced to avoid contamination.	3.54	1.16
15	In conservation tillage, farmers use more pesticides.	3.52	1.23
16	Chemical application rates are higher when using reduced tillage.	3.52	1.30
17	Banding herbicides is an effective measure to reduce tillage systems.	3.51	1.23
18	Farmers use more herbicides than necessary	3.31	1.73
19	No-till planting is a conservation practice that will work on my farm.	3.26	1.31
20	A cover crop planting in HEL would be an acceptable alternative practice to no-till.	3.24	1.17
21	Federal government should give higher payments to enroll more acres in CRP.	3.00	1.29
22	Agricultural pesticides, if used correctly, pose no threat to water quality.	2.97	1.19
23	Commercial soil test labs recommend correct amounts of fertilizer.	2.91	1.10
24	Groundwater research should be funded through a surtax on pesticides.	2.88	1.30
25	Fertilizer equipment is adequately designed for conservation tillage.	2.82	1.09
26	Atrazine should be banned until the potential effects are known.	2.80	1.32
27	Nitrogen rates could be reduced on my own farm.	2.72	1.17
28	Conservation tillage results in reduced crop yields.	2.62	1.26
29	Relaxing soil loss requirements by the USDA is an appropriate plan.	2.46	1.34
30	Groundwater warning statements found on pesticide labels are effective.	2.46	1.16
31	Fertilizer rates need to be higher when using reduced tillage systems.	2.31	1.09
32	Increased use of reduced tillage systems is a threat to water quality.	2.28	1.21

*Scale- 1 = Strongly Disagree; 2 = Somewhat Disagree; 3= Neutral; 4 = Somewhat Agree; 5= Strongly Agree.

FARMER PERCEPTIONS OF SOIL AND WATER CONSERVATION ISSUES: IMPLICATIONS TO AGRICULTURAL AND EXTENSION EDUCATION

A Critique

Michael K. Swan, North Dakota State University--Discussant

The authors are to be commended for investigating an issue significant to the Agricultural and Extension Education profession. The transfer of technologies from one to another is an important concept, but additional problems may indeed arise. Research partnerships and cooperation between agricultural education and other agencies are a delight to see. These researchers are to be commended for their working relationship with business and industry.

The authors developed a sound theoretical framework for their perception study. The purpose and objectives of the study were clearly written, and the procedures for gathering the data were presented logically and were appropriate for this research. The instrument developed for this study was identified as having a strong reliability coefficient, .79 to .95. I would have liked to see a stronger return rate than 59.1%.

The results were clearly written. Tables were clear and concise in their presentation. An interesting part of the paper was the inclusion of individual farmer responses about perceptions of soil and water conservation. Conclusions were supported by the results of this research study.

In reviewing this paper, the following questions are proposed to the authors for consideration:

1. What was the time of year the survey questionnaire was sent out to the selected group?
2. Do you think that farmers really understand the purpose of agricultural and extension education and because of this don't participate in training other than that involving demonstrations/tours?
3. From this study, how would you propose to stimulate interest in educational programs for adult farmers in our nations?

COMMUNITY EDUCATIONAL ADVISORY COUNCILS AND AGRICULTURAL EDUCATION PROGRAM STATUS IN ILLINOIS: A QUANTITATIVE PERSPECTIVE

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INTRODUCTION

America's once unchallenged preeminence in commerce, industry, science, education, and technological innovations is being overtaken by competitors throughout the world. Some of the educational dimensions that constitute indicators of a crisis are poor achievement test scores, poor work habits and skills, declining enrollments, the high cost of remedial training programs, unacceptable levels of functional literacy found among American children and adults, and poor teachers' working conditions (Passow, 1984; National Commission on Excellence in Education, 1983).

Improving all aspects of the education of Americans is universally accepted as prerequisite to advancing the country's economic and educational well being. Improving the occupational education and training offered in our schools is an essential part of the task. America would be more competitive in the world economy and in its standard of education (especially in high schools) by developing more fully the academic and occupational skills of all segments of the population. This could be achieved by concentrating resources on improving educational programs leading to academic, occupational training, and re-training skill competencies needed to work in a technologically advanced society (HR 101-41, 1989; PL 101-392, 1989; Wilcox, 1991; National Commission on Excellence in Education, 1983).

Wherry (1991) stated that schools alone cannot solve all educational problems. Schools can still learn more about how to do a better job in their classrooms. Even though the schools are working hard to improve, nothing the professionals in schools do will ever be good enough. The help of others must be enlisted. The help and advice of members of the immediate community is one means to help get the job done. Active involvement of parents and other people within the community must be encouraged by policy makers.

The school and the community cannot be in isolation from one another. They must work together, interconnect and seek each other's advice in order to improve educational programs in the schools (Henderson, 1989). There is a need for involvement and commitment of local communities and leadership to affect the curricula, standards, and overall policy changes they suggest for the schools (Gross and Gross, 1985). Boyer (1983) suggested actions for parents, community school board and district level leadership. These range from volunteer service to school board membership where responsibilities include finances, personnel, and coordination. Local and community involvement and leadership are viewed as central to school improvement. American high schools are only as strong as the community of which they are a part. The renewal of schools must quite literally begin at home and with the involvement of people within the community. One way of involving the people is through advisory councils.

Advisory committees for local agricultural programs can have positive effects.

Agriculture teachers can maximize the effectiveness of local advisory committees by clearly delineating their goal, establishing criteria for selecting the committee, and by establishing operational procedures for the committee. Agriculture teachers, school administrators, and agriculture advisory committee can effectively work together to form a partnership that will promote both excellence in agricultural education programs, and effective school community relations (Whaley and Sutphin, 1988).

Edwards (1988) said that the partnership between local citizens and the school is very important. Local citizens have helped schools in tackling and reducing student pregnancy, drug abuse, and drop outs. It is therefore imperative to constantly seek their advice and help.

PURPOSES AND OBJECTIVES

The purpose of the study was to contribute to a better understanding of the importance and necessity of advisory councils, and school community relationships in improving education. More specifically, the study attempted to analyze and identify the relationships between advisory councils and agricultural education program status. Based on the purpose of the study, the following research questions were posed:

1. Is there a relationship between the existence of an agricultural education advisory council (ADV), and agriculture teachers' salaries (SAL), contract length in months (CON), student enrollment (ENR), FFA membership (FFA), number of students participating in Supervised Agricultural Experience Project (SAE), number of teachers' professional development activities (PRO), number of students graduating from agriculture programs (GRA), and agriculture education program budget (BUD)?
2. What is the relationship between the number of meetings of advisory councils (MEE), and Future Farmers of America student club membership (FFA) CON, SAL, ENR, SAE, PRO, GRA, and BUD?
3. Is there a relationship between the existence of an operational agricultural advisory council (OAD) and overall agricultural education program status score (SUC)?

PROCEDURES

The population for the study were all high school agriculture education programs in the state of Illinois. The total number of high school agriculture programs (teachers) studied (1990/91 academic year) was 312. All members of the population were studied, therefore no sampling was done.

The data for the study were obtained from two sources. To answer research questions 1 & 2, the Good News Survey (1991) was used, and for research question 3, the Application for Supplemental Funds for Agricultural Education Questionnaire (1991) was used. These data were already available.

The Good News Survey was developed jointly by the Illinois FFA Center, Illinois Association of Vocational Agriculture Teachers (IAVAT), Illinois Department of Adult, Vocational and Technical Education (DAVTE), and Agricultural Education Department, Southern Illinois University, Carbondale. The instrument has been in use for five years. The Application for Supplemental Funds For Agricultural Education was developed by

Illinois agriculture teachers. (see Table 1).

The data were analyzed using Pearson correlation coefficient and regression analyses (.05 level). The computer Statistical Analysis System (SAS) was used in the data analysis.

TABLE 1
APPLICATION FOR SUPPLEMENTAL FUNDS SUMMARY

	QUALITY INDICATORS/FACTORS	VALUE POSSIBLE
1.	Qualified Teachers (QTR)	30
2.	Student Services (STS)	4
3.	Instructional Programs (INP)	15
4.	Supervised Agriculture Experience Program (SAE)	9
5.	Agricultural Student Organizations (FFA)	10
6.	Facilities, Equipments, and Supplies (FES)	14
7.	Agricultural Advisory Committees (OAD)	15
8.	Adult Agricultural Education Programs (ADT)	3
9.	Overall Agricultural Education Program Status Score (SUC)	100

ANALYSIS OF DATA AND RESULTS

A total of 275 (88%) teachers responded to the Good News Survey, while all 312 (100%) teachers responded to the Application For Supplemental Funds. Results from the analysis of data collected are presented below. The total number of teachers having agriculture councils were 188, those with a general council were 32, and those with no advisory councils were 55. See Tables 2 and 3 for a summary of the results of the data analysis.

TABLE 2

MEAN SCORES OF PROGRAMS WITH AGRICULTURE COUNCILS (AC), GENERAL COUNCILS (GS), AND NO COUNCIL (NC) ON SELECTED VARIABLES

GROUP	N	CON	BUD	ENR	PRO
AC	188(68.4%)	10.0	$1864	76.63	7.3
GC	32(11.6%)	9.71	$1827	51.84	6.3
NC	55(20.0%)	9.10	$1019	32.98	4.8

GROUP	N	FFA	SAE	GRA	MEE
AC	188(68.4%)	66.28	54.73	13.96	3.48
GC	32(11.6%)	31.72	23.66	8.00	2.71
NC	55(20.0%)	27.36	16.84	6.87	0.00

*The average salary range (SAL) of teachers with programs having AC was $25,000-$27,500, $27,500-$30,000 for programs with GC, and $22,500-$25,000 for programs without advisory councils (NC).

TABLE 3

INTERCORRELATIONS AMONG TESTED VARIABLES

	ADV	MEE	CON	SAL	BUD	ENR	FFA	GRA	SAE	PRO
ADV	--	.60	.20	.07	.12	.21	.20	.17	.19	.20
MEE		--	.22	.09	.15	.20	.21	.20	.21	.24
CON			--	.31	.15	.10	.09	.07	.08	.19
SAL				--	.13	.17	.08	.13	.08	.04
BUD						-.04	-.05	-.05	-.09	.16
ENR						--		.92	.91	.01
FFA								.91	.96	.03
GRA								--	.90	.04
SAE									--	.04
PRO										--

Correlations (*r*) of .13 and greater are significant at .05 level.
N=275. The correlation coefficient (*r*) for the existence of operational advisory council (OAD) and overall agricultural education status score (SUC) is 0.78 (significant) (N=312)

Research Question 1: A relationship was found between existence of agriculture advisory councils (ADV) and all other variables except agriculture teachers' salaries (SAL) and agriculture program budget (BUD). See Tables 3 and 4. The correlation of ADV with all other variables were .13 or greater, except for SAL and BUD which were .07 and .12 respectively. These correlations were not significant .05 level of significance.

TABLE 4
REGRESSION ANALYSIS FOR THE INDEPENDENT VARIABLE EXISTENCE OF COUNCIL (ADV) ON ALL OTHER VARIABLES

SOURCE	F	p^*	r^2	SIGNIFICANCE
CON by ADV	11.158	.0010	.0393	SIG
SAL by ADV	1.244	.2657	.0045	N.S.
FFA by ADV	10.845	.0011	.0382	SIG
GRA by ADV	8.341	.0042	.0296	SIG
PRO by ADV	10.935	.0011	.0385	SIG
BUD by ADV	3.748	.0538	.0135	N.S.
ENR by ADV	12.126	.0006	.0425	SIG
SAE by ADV	9.844	.0019	.0348	SIG

* .05 significance level, SIG(significant) N.S.(not significant).

Research Question 2: A relationship was found between the number of meetings of advisory councils (ADV) and all other variables except agriculture teachers' salaries (SAL). (Tables 3 and 5). The correlations of ADV with all other variables were .13 or greater except with SAL which was .089. This correlation with SAL was not significant at .05 level.

TABLE 5
REGRESSION ANALYSIS FOR THE INDEPENDENT VARIABLE NUMBER OF MEETINGS OF COUNCIL (MEE) ON ALL OTHER VARIABLES

SOURCE	F	p^*	r^2	SIGNIFICANCE
CON by MEE	14.264	.0002	.0497	SIG
SAL by MEE	2.205	.1387	.0080	N.S.
FFA by MEE	13.017	.0004	.0455	SIG
GRA by MEE	10.517	.0013	.0371	SIG
PRO by MEE	16.317	.0001	.0564	SIG
BUD by MEE	6.001	.0149	.0215	SIG
ENR by MEE	11.492	.0008	.0404	SIG
SAE by MEE	12.181	.0006	.0427	SIG

* .05 significance level, SIG(significant) N.S.(not significant).

Research Question 3: A relationship was found between the existence of an operational advisory council (OAD) and overall agricultural education program status score (SUC). See Table 6.

The stepwise regression procedure for the dependent variable (total agricultural education program status score) showed that the existence of an operational agricultural advisory committee (OAD) was the best single predictor of total agriculture education program status score (SUC). It accounted for 60 percent of the variance in SUC score. The other predictors in order of importance for SUC scores were qualified teachers (QTR), supervised agriculture experience program (SAE), instructional programs (INP), agricultural student organizations (FFA), student services (STS), facilities, equipments and supplies (FES), and the weakest is adult agricultural education programs (ADT). See Table 6a.

TABLE 6

REGRESSION OF OVERALL AGRICULTURAL EDUCATION STATUS SCORE BY EXISTENCE OF OPERATIONAL COUNCILS

SOURCE	DF	SS	MS	F	p^*	r^2
Regression	1	39714.19	39714.19	486.21	.0001	.6107
Residual	310	25321.26	81.68			
Total	311	65035.46				

*$p<.05$, is significant. F(1,310)=3.86 R:F(486.21)>3.86 N=312

TABLE 6a
SUMMARY OF STEPWISE REGRESSION PROCEDURE FOR THE DEPENDENT VARIABLE TOTAL AGRICULTURAL EDUCATION PROGRAM STATUS SCORE

VARIABLE ENTERED	NUMBER IN MODEL	PARTIAL R^2	MODEL R^2	STEP PROB>F
OAD	1	.6045	.6045	.0001
QTR	2	.2145	.8190	.0001
SAE	3	.1021	.9211	.0001
INP	4	.0323	.9533	.0001
FFA	5	.0173	.9707	.0001
FES	6	.0196	.9902	.0001
STS	7	.0033	.9935	.0001
ADT	8	.0023	.9958	.0001

N=312 (OAD and ADV differ in that they came from different questionnaires, OAD came from Application for Supplemental Funds, while ADV came from the Good News Survey)

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of analysis of data presented above, the following conclusions were made:

(1) Members of the advisory councils represent the local community, and can influence the decisions of school boards, and agriculture education programs in high schools. The existence of agricultural advisory councils has some influence on the length of teachers' contracts, the number of professional development activities by teachers, and agriculture student enrollment. Other areas of possible influence are FFA and SAEP student participation, and the number of students graduating from agriculture programs. In general, the existence of advisory councils is a good predictor of total agricultural education program status score, and many other quality indicators of the agriculture education programs.

(2) The study showed a relationship between number of council's meetings (MEE), and agriculture budget, student enrollment, teacher's contract, and student participation in SAEP. There was also a relationship between MEE, and number of agriculture teacher's professional development activities, and the number of students graduating from agriculture programs. This probably indicates that the more times the council meets the more they discuss and find solutions to problems and issues such as budget, enrollment, teachers contract, SAEP, teachers' professional development activities, and graduation rate.

Based on these findings, the following recommendations were made:

1. Agriculture teachers in high schools (offering agriculture) without an advisory council should establish an agriculture advisory council. Those having a general advisory council should make efforts to establish an agriculture advisory council. This is based on the

relationship between existence of advisory councils, and teachers' contracts, student enrollment, teachers' professional development activities, and many other quality indicators (See Tables 3 and 4); and the relationship between existence of an operational agriculture advisory council, and total agriculture education program status score.

2. Agriculture teachers should urge their council members to meet at least four times a year (two times per semester). This is because of the relationship between the number of meetings of advisory councils, and agriculture budget, enrollment, SAEP participation, contracts, FFA membership, teachers professional development activities, and number of students graduating from agriculture education programs.

Based on the findings of this study and a review of the literature regarding the conduct of advisory councils, the following recommendation is made:

Even though the agricultural education advisory councils have a positive relationship and some influence on the overall agricultural education program status and some important aspects of agricultural education program, agriculture teachers should be cautious on how they implement advisory council's recommendations. Teachers should not allow the council or its member(s) to dictate how the program should be run. Agriculture teachers should examine carefully the advice, ideas, recommendations, or suggestions of the council, and implement items which they (agriculture teachers) deem appropriate. If there is any flaw, the blame would be on the teacher and not the advisory council.

However, the establishment of agriculture advisory councils, is one of the major desirable cornerstones of the agricultural education programs in high schools, and all agriculture teachers should take steps to establish one.

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COMMUNITY EDUCATIONAL ADVISORY COUNCILS AND AGRICULTURAL EDUCATION PROGRAM STATUS IN ILLINOIS: A QUANTITATIVE PERSPECTIVE

A Critique

Michael K. Swan, North Dakota State University--Discussant

The authors are to be commended for their selection of a research topic. An area in which we all believe but sometimes let get away from us. Advisory councils have long been viewed as an important and vital part of our agricultural education programs. The authors' investigation may lead to a better understanding of the necessity of functioning advisory councils.

The authors developed a sound theoretical base from which to develop their research questions. The purpose and objectives were identified clearly. The instrument selection was appropriate to meet the research questions. Data collection and analysis of data were appropriate for the research presented.

The results were presented in a workable manner. The conclusions and recommendations were supported by the results for the study.

The following questions are offered to the authors for consideration:

1. The FFA has changed its name from Future Farmers of America. Shouldn't we now use only FFA?
2. How do you suggest we go about developing advisory councils in all agricultural education programs?
3. How do you suggest that we train new prospective teachers about the importance of advisory councils?

SAFETY ATTITUDES, POLICIES, AND PROCEDURES OF ADMINISTRATORS IN COMPREHENSIVE HIGH SCHOOLS

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INTRODUCTION

"A positive attitude toward skill development is a prerequisite to the safety of an individual. The teacher is responsible for promoting desirable attitudes that assist pupils in developing a proper respect for safety regulations" (Kigin, 1983, p. 93). Similarly, Harper and McCracken (1984) recommended that "teachers should work towards demonstrating a positive safety attitude, a sound knowledge of safety, and maintain school facilities in safe working conditions" (p. 10).

The primary responsibility for providing safety instruction and a safe working environment belongs to the teacher (McMahon, 1975), but can teachers ensure a safe working environment without support from school administrators?

Bear (1980) wrote that " safety programs will happen when the administrator supports them and will cease when the interest and attention has been eliminated or become lax" (p. 76). Additionally, McMahon (1975) wrote that "... the single most effective force behind the development of a viable, overall safety program is the support of an administrator who accepts its importance and by his own attitude encourages a safety consciousness throughout his administrative unit" (p. 18). Even so, teachers have expressed the opinion that administrators give only lip service to school safety issues (Bear, 1980).

Some researchers (Bennett, 1983 & Petty, 1988) have sought to determine if the perceptions of vocational program safety needs differ between school administrators and vocational teachers, but a review of the literature yielded no studies that focussed specifically on administrators. If one can hypothesize that administrative support is essential to ensuring a safe environment in vocational laboratories, then it becomes important to determine administrator attitudes toward safety in vocational laboratories. Additionally a need exists to determine what policies and procedures are utilized by administrators for the purpose of ensuring a safe and healthful school environment.

PURPOSES AND OBJECTIVES

The purpose of this descriptive study was to investigate safety attitudes and policies and procedures of administrators in comprehensive high schools with agricultural education programs. The research objectives were to:

1. Describe the safety attitudes of administrators in comprehensive high schools with agricultural education programs.
2. Describe selected safety policies of administrators in comprehensive high schools with agricultural education programs.

3. Describe selected procedures followed by administrators in comprehensive high schools with agricultural education programs to insure safety in vocational programs?

PROCEDURES

The population for this descriptive survey included all principals of comprehensive high schools with agricultural education programs in Ohio (N = 260). The Ohio Directory of Agricultural Education was utilized to develop the list of comprehensive high schools with agricultural education programs. Based upon Krejcie and Morgan's (1970) formula for a 5 % margin of error a random sample of 155 schools was drawn.

The questionnaire utilized in this study was developed by the researchers. The questionnaire consisted of three parts including the administrator's safety attitude, policies, and facilities and inspection. Content and face validity were established by a panel of experts consisting of faculty and graduate students in the departments of Agricultural Education and Agricultural Engineering at The Ohio State University. Cronbach's Alpha was used to assess the reliability of part one (The Administrators' Safety Attitude) of the questionnaire. The reliability coefficient was .73. Since items in parts two and three requested factual responses, reliability was not estimated.

The questionnaire along with a cover letter and stamped return envelope were sent to all principals of comprehensive high schools with agricultural education programs included in the sample. Approximately four weeks after the initial mailing a second complete package including the questionnaire, a cover letter, and a stamped return envelope was sent to all non-respondents. The response rate was 83%. Non-response error was controlled by comparing early to late respondents (Miller & Smith, 1983). No significant differences were found between early and late respondents. Although each package was addressed to the principal, some of the respondents were vocational directors. Therefore, respondents were referred to as administrators.

ANALYSIS OF DATA

All data were analyzed using the Statistical Package for the Social Sciences, Personal Computer Version (SPSS/PC+). Appropriate statistical procedures for description (frequencies, percents, means, and standard deviations) were used.

RESULTS

Administrators were asked to indicate their level of agreement with 15 items designed to measure their attitude toward safety in vocational education. Response categories for this Likert type scale ranged from (1) strongly disagree to (5) strongly agree. The administrators' mean safety attitude score was 4.39 with a standard deviation of .31 (Table 1).

Table 1

Administrators' Attitude Towards Safety in Vocational Education

Item	Strongly Disagree n	Strongly Disagree %	Disagree n	Disagree %	Undecided n	Undecided %	Agree n	Agree %	Strongly Agree n	Strongly Agree %
1. Safety is one of my top priorities.	0	0.0	0	0.0	2	1.6	30	23.4	96	75.0
2. I insist that vocational teachers model safe behavior.	0	0.0	0	0.0	1	0.8	43	33.6	84	65.6
3. I communicate to students and teachers a strong commitment to safety.	0	0.0	0	0.0	2	1.6	66	51.6	60	46.9
4. I sometimes use equipment in the vocational laboratory in an unsafe manner.	69	55.2	42	33.6	10	8.0	4	3.2	0	0.0
5. It is alright if teachers operate equipment in an unsafe manner as long as students are not present.	89	69.5	35	27.3	1	0.8	1	0.8	2	1.6
6. Safety should be an integral part of the instructional program in vocational education.	1	0.8	0	0.0	0	0.0	17	13.3	110	85.9
7. Maintaining a safe environment for vocational education students is an important part of my job.	0	0.0	1	0.8	2	1.6	45	35.4	79	62.2
8. Administrators should completely delegate responsibility for safety to teachers.	27	21.1	61	47.7	6	4.7	29	22.7	5	3.9

(Table continued)

Table 1 continued.

Item	Strongly Disagree n	Strongly Disagree %	Disagree n	Disagree %	Undecided n	Undecided %	Agree n	Agree %	Strongly Agree n	Strongly Agree %
9. Administrators should be familiar with safety standards for vocational education programs.	0	0.0	3	2.3	2	1.6	86	67.2	37	28.9
10. Students posing a continual threat to their own safety should remain in the vocational laboratory.	72	56.3	46	35.9	3	2.3	3	2.3	4	3.1
11. Students posing a threat to the safety of other students should be removed from the vocational laboratory.	2	1.6	6	4.7	1	0.8	41	32.0	78	60.9
12. Vocational teachers should periodically update their knowledge of current safety standards.	0	0.0	0	0.0	0	0.0	61	47.7	67	52.3
13. Vocational teachers needing to upgrade their safety knowledge should do so at their own expense.	17	13.4	69	54.3	27	21.3	9	7.1	5	3.9
14. Safety needs should be given priority in the school budget.	0	0.0	3	2.4	11	8.7	78	61.4	35	27.6
15. Equipment that is not in safe operating condition must not be used until it has properly been repaired.	0	0.0	0	0.0	0	0.0	29	22.7	99	77.3

Mean = 4.39 Std. Dev. = .31

Note. Items 4, 5, 8, 10, and 13 were considered to be negative.

Table 1 further reveals that slightly more than 98% (126) of the administrators agreed or strongly agreed that safety was one of their top priorities. However, slightly more than 3% (4) of the administrators were undecided, agreed, or strongly agreed with the following statement; "It is alright if teachers operate equipment in an unsafe manner when students are not present". Similarly, approximately 11% (14) of the administrators were undecided or agreed with the following statement; "I sometimes use equipment in the vocational laboratory in an unsafe manner". Most of the statements elicited consistently positive responses from the administrators. Administrators were less consistent in their responses to statements regarding the delegation of responsibility for safety and expenses for staff development in safety.

Table 2 indicates that 58.6% (75) of the administrators surveyed considered themselves to be competent in determining whether or not vocational laboratories were safe while 41.4% (33) of the administrators perceived themselves as not being competent in this area.

Table 2
Administrators' Perceptions of Their Own Competence in Determining What Constitutes a Safe Vocational Laboratory

Perception	n	%
Competent	75	58.6
Not Competent	33	41.4

Table 3 displays the administrators' perceptions regarding the ability of vocational teachers in their school to provide instruction in safety. Administrators in 74% (94) of the schools perceived vocational teachers as being very well prepared to provide instruction in safety while another 22.8% (29) perceived vocational teachers to be moderately well prepared. Only .8% (1) of the administrators perceived vocational teachers in their schools to be poorly prepared to provide safety instruction.

Table 3
Administrator Perceptions Regarding the Ability of Vocational Teachers to Provide Instruction in Safety

Extent of Preparedness	n	%
Very well prepared	94	74.0
Moderately prepared	29	22.8
Somewhat prepared	3	2.4
Poorly prepared	1	0.8

Tables 4 and 5 show the number of administrators who inspect vocational laboratories for safety and sources of information used for these inspections. Table 4 shows that 78.7% (100) of the administrators personally inspect vocational laboratories. Table 5 shows that most (82.3%) administrators obtain safety information from teacher educators. In addition, more than half of the administrators utilize information provided by the State Department of Education and the Ohio Department of Safety.

Table 4
Whether or Not Administrators Inspect Vocational Laboratories for Safety

Inspection	n	%
Yes	100	78.7
No	25	19.7

Table 5
Sources of Information Utilized by Administrators in Making Safety Inspections

Source	n	%
Teacher educators	102	82.3
State Department of Education	82	66.1
Ohio Department of Safety	67	54.0
Other Sources	38	30.9

Table 6 displays administrator responses regarding the responsibility for repair and maintenance of equipment in vocational laboratories. Teachers were responsible for repair and maintenance of equipment in 92% (115) of the schools. Janitors and outside contractors were responsible for repair and maintenance of equipment in 62.1% (77) and 63.7% (79) of the schools respectively. Other persons performed repair and maintenance on equipment in 30.6% (37) of the schools. When asked to specifically name other persons responsible for repair and maintenance of equipment, administrators in 26% (33) of the schools listed school maintenance personnel.

Twenty nine percent (37) of the administrators indicated that vocational teachers were required to have training in first aid (Table 7). Table 7 further shows that 82.3% (102) of the administrators surveyed maintain written policies on safety. Administrators in 79.2% (99) of the schools indicated that handicapped students participate in vocational laboratory instruction, but only 68.4% (67) of the administrators indicated that special provisions were made for the safety of handicapped students (Table 7).

Table 6

Persons Responsible for Repairing and Maintaining Equipment in Vocational Laboratories, As Reported by Administrators

Person Responsible	n	%
Teachers	115	92.0
Janitors	77	62.1
Outside Contractors	79	63.7
Other	37	30.6

Table 7

Existence of Selected Safety Policies as Reported by School Administrators

Policy	n	%
Require teacher training in first aid	37	29.1
School maintains written safety policies	102	82.3
Handicapped students participate in vocational laboratory instruction	99	79.2
Special provisions made for the safety of handicapped students	67	68.4

CONCLUSIONS AND/OR RECOMMENDATIONS

Safety is important to administrators, and they overwhelmingly agree that it should be an integral part of the instructional program in vocational education. Teachers should be aware of the expectations that administrators have regarding safety in vocational education. It is recommended that the results of this study be shared with preservice and inservice teachers so that they might understand the importance of safety to school administrators.

Most administrators inspect vocational education facilities, and 82.3% depend upon the knowledge and expertise of teacher educators in making safety inspections of vocational laboratories. Additionally, most of the administrators felt competent in determining what constitutes a safe vocational laboratory. Teacher educators in vocational programs should disseminate current safety materials to high school administrators, and provide workshops for administrators interested in upgrading their safety knowledge.

Administrators expect vocational teachers to repair and maintain equipment in vocational laboratories. It is recommended that preservice teacher preparation programs ensure that prospective teachers have the knowledge and skill needed to repair and maintain equipment in vocational laboratories. Furthermore, staff development activities should be planned for vocational teachers needing to upgrade their safety knowledge and equipment maintenance skills.

Administrators in most schools report that handicapped students are assigned to vocational classes. While most administrators reported that special provisions were made for the handicapped students, 31.6% indicated that no such provisions were made. Both administrators and teachers must be aware of the special needs of handicapped students enrolled in vocational programs. Efforts should be made to insure that educators are knowledgeable of the special needs of handicapped students and are capable of dealing with them in vocational laboratory settings.

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SAFETY ATTITUDES, POLICIES, AND PROCEDURES OF ADMINISTRATORS IN COMPREHENSIVE HIGH SCHOOLS

A Critique

Carl L. Reynolds, University of Wyoming--Discussant

Concern for safety issues in our agricultural education facilities reflects a need for continued research efforts by the profession. The authors are to be commended for responding to this important research need. Realizing the assumption that administrators exercise a degree of influence on the practices followed by teachers, identifying the attitudes of administrators toward safety adds an important piece of knowledge to the research base in this field.

The theoretical framework for this particular study is well established, and the objectives were clearly stated, which led to a very clear understanding of the problem and the purpose of the study. The researchers are to be commended for presenting the framework, purpose, and objectives in such a clear and succinct manner. The steps followed in the procedure of selecting the sample, developing and testing the instrument, and conducting the survey were performed in an appropriate manner. The response rate of 83 percent should pose no serious threats to the results obtained from the sample. The analysis procedures were appropriate for the nature of the study.

It was anticipated that this group of administrators would respond positively toward the importance and practice of safety in vocational education which they did. It was surprising though, that even a small percentage (3%) would agree it was alright for teachers, when alone, to operate equipment in an unsafe manner. The most interesting result however, which I would like to challenge, is that 78.7 percent indicated they inspected laboratories for safety. This challenge is not pointed toward the researchers for any error they have made, but is an item that could have appeared in the conclusions. Given that 41.4 percent indicated they did not feel competent in determining what constitutes a safe vocational laboratory, I fail to believe that 78.7 percent who indicated so are effective in inspecting vocational laboratories for safety.

The point made is not intended as a criticism of the quality of the study conducted and reported here. It only brings to bear the concern all of us should maintain when conducting social science research. Perceptions are opinions and since safety related matters have such severe liability ramifications for administrators, caution should be exercised when analyzing the results. I would encourage discussion as to additional measures other than perceptions that could be collected that would enhance this valuable piece of research.

AN ANALYSIS OF AGRICULTURAL MECHANICS SAFETY PRACTICES IN TEXAS AGRICULTURAL SCIENCE PROGRAMS

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INTRODUCTION

Agricultural Laboratories found in secondary agricultural science programs are potentially hazardous. These laboratories include agricultural mechanics laboratories, green houses, school farms, and even livestock shows which are used as learning experiences. Students are exposed to metal working, wood working, agricultural machinery, electricity, livestock, chemicals, and other processes which could pose serious injury. "These students often are not experienced in working in these environments. However, the curriculum requires that these relatively inexperienced students use and be around tools, equipment, supplies, and situations which present real possibilities for serious injury or death" (Johnson and Fletcher, 1990, p. 189).

Many teacher educators (Cook, Walker, and Snowden, 1952; Bear and Hoerner, 1986) have stressed the importance of safety due to the inherent dangers which are associated with agriculture. Even with the recognition of the importance of safety, several studies have documented unsafe conditions in the nation's agricultural laboratories (Brown, 1977; Lamb, 1984; Rudolph and Dillon, 1984; Gleim and Hard, 1984; Burke, 1989; and Johnson and Fletcher, 1990)

According to Burke (1989) accident frequency in Virginia agricultural mechanics programs was five student accidents per teacher per year. This rate was determined to be excessive. Johnson and Fletcher (1990) studied Mississippi secondary agriculture teachers and found that they were not using recommended safety practices or providing student safety and emergency equipment to the extent warranted by the hazards present in the agricultural mechanics laboratory. No current literature was found concerning the status of safety practices in agricultural science laboratories located in Texas. Therefore, it was been determined that a need existed to examine the agricultural safety practices used in Texas Agricultural Science programs.

The benefit to be derived from this research included identification of specific areas of deficient safety practices. Through this identification, recommendations can be made concerning the improvement of safety programs. Inservice offerings designed to improve safety programs will be planned. The ultimate benefit of this research and subsequent efforts will be a safer learning environment for children enrolled in agricultural science programs in the state of Texas

Inadequate safety programs are costly. With the rising cost of medical services, liability insurance, and other associated services, the potential expense is great. If, like Virginia teachers, Texas teachers average five student accidents per year we can very conservatively estimate a total cost of $711,500 if those accidents average $100 each. Of course, a single serious accident with potential associated law suits could exceed this estimate.

PURPOSE AND OBJECTIVES

Based upon personal observations and a review of related literature, the researcher determined that a need existed to examine safety conditions and safety instructional practices in Texas secondary agricultural mechanics programs. This study was conducted to provide baseline data from which recommendations can be made for safety program improvements. Specific objectives were as follows:

1. To determine the degree if selected agricultural safety practices (e.g. equipment color coding, provision of equipment safety guards, etc.) are used by Texas agricultural science teachers.
2. To determine the availability of selected safety and emergency equipment items in Texas agricultural science laboratories.

3. To determine the instructional methods and materials used by Texas Agricultural Science teachers to teach agricultural safety.
4. To determine perceptions held by Texas agricultural science teachers concerning the importance of agricultural mechanics safety instructional topics or practices.
5. To determine perceptions held by Texas agricultural science teachers concerning their preparedness to present agricultural mechanics safety instructional topics or practices.

PROCEDURES

Design. A descriptive research design, with data collected via mailed surveys, was used to meet the research objectives.

Population and Sampling. The population for this study was all Texas Agricultural Science teachers employed for the 1990-1991 academic year. For the 1989-1990 academic year there were 1423 Agricultural Science teachers in Texas. According to Krejcie and Morgan (1970) a random sample of 306 subjects was adequate for generalization to the population. A set of mailing labels was obtained from the Instructional Materials Service at Texas A&M University from which the sample was randomly selected.

Instrumentation. The instrument developed by Hoerner and Kessler (1989) was slightly modified to fit Texas conditions and used in this study. This instrument has been successfully used in similar studies in Illinois, Kansas, Minnesota, Nebraska, Ohio, Oregon, Pennsylvania, and Mississippi.

The revised instrument contained two parts. Part one solicited relevant demographic information. Part two solicited responses concerning safety practices, equipment, and instructional methods and materials.

The revised instrument was examined by the faculty in the Department of Agricultural Education and Mechanization at Texas Tech University and judged to be valid. To further insure the validity of the instrument, it was pilot tested with the student teachers from the Fall 1990 student teaching block.

Statistical Analysis. Descriptive statistics were used to describe the sample participating in this study.

FINDINGS

Usable responses were received from 237 of 306 teachers for a 77% response rate. Comparison of early and late respondents on selected demographic variables revealed no significant ($p<.05$) difference. Therefore, according to Miller and Smith (1983), the results were generalizable to the population.

The typical respondent:

- Had 13 years of teaching experience,
- Had 15 semester hours of college-level agricultural mechanics course work as an undergraduate,
- Was reared and/or worked on a farm or ranch (87.8%),
- Was enrolled in shop type classes in high school (92.4%),
- Had liability insurance coverage in excess of $100,000 (76.8%),
- Had 13.5 students in their agricultural mechanics classes,
- Was not certified in first aid (74.3%),
- Felt confident in their ability to deliver first aid (73.6%),
- Felt moderately to very well prepared to provide safety instruction in agricultural mechanics (89.4%)
- Devoted 38% of their instructional time to teaching agricultural mechanics,
- Devoted 16% of their instructional time in agricultural mechanics to safety related instruction,
- Teaches in an agricultural mechanics facility with 1000 to 3000 square feet of floor space

(62.4%).
- Teaches in an agricultural mechanics facility that is 5 to 25 years old (71.3%).

When asked to report the number of major accidents (requiring attention by a doctor or a nurse) which had occurred in their agricultural mechanics program during the last five years, the mean response was 0.8 accidents. The modal response was zero accidents (n = 138). One respondent reported 13 such accidents. Minor accidents (requiring minor first-aid but no attention by a doctor or a nurse) occurred in agricultural mechanics programs during the same period. The mean number of minor accidents was 5.7 accidents. The modal response was 5 minor accidents (n = 36). One respondent reported 50 minor accidents. Only 123 (54.4%) of the respondents indicated that they maintained file of written reports of all accidents occurring in their agricultural mechanics laboratory.

Teachers where asked to indicate the instructional techniques they employ in their agricultural mechanics safety programs. As can be seen in Table 1, the most commonly used technique involved the teacher demonstrating the safe use of hand tools (n = 226, 95.4%). Of the 237 respondents, 225 (94.9%) indicated the use of safety examinations which the student must pass and 224 (94.5%) responded that they demonstrated the safe operation of power tools. The least used technique was scheduled safety inspections
(n = 73, 30.8%).

Table 1. *Instructional Techniques Used By Texas Agricultural Science Teachers in Their Agricultural Mechanics Safety Program.*

	Use Technique		Do Not Use	
Instructional Technique	n	%	n	%
Students study safety subject matter	217	91.6	20	8.4
Teacher conducts hand tool safety demos	226	95.4	11	4.6
Teacher conducts power tool safety demos	224	94.5	13	5.5
Students demonstrate safe use of hand tools	205	86.5	32	13.5
Students demonstrate safe use of power tools	201	84.4	36	15.2
Students must pass safety exam	225	94.9	12	5.1
Students safety exams are kept on file	192	81.0	45	19.0
Each student has copy of eye safety regs.	80	33.8	157	66.2
Scheduled safety inspections are conducted	73	30.8	164	69.2
Clean-up schedule is used	181	76.4	56	23.6
Clean-up schedule designates student safety engineer	31	13.1	206	86.9
Clean-up schedule designates student clean-up foreman	69	29.1	168	70.9

Teachers where also asked to indicate the instructional materials used for safety instruction. Table 2 shows that worksheets were the most commonly used instructional material (n = 205, 86.5%). One hundred ninety three (81.4%) indicates that manual and booklets are used in their programs.

Table 3 shows the personal safety equipment which is made available for student use in Texas Agricultural Science Programs. The most commonly provided items of safety equipment are welding gloves (n = 234, 98.7%) and industrial quality eye protection (n = 230, 97.0%). Ear plug style hearing protection was provided by 40 respondents (16.9%) while muff style hearing protection was provided by 18 respondents (7.6%)

Table 2. *Instructional Materials Used By Texas Agricultural Science Teachers in Their Agricultural Mechanics Safety Program.*

	Use Materials		Do Not Use	
Instructional Materials	n	%	n	%
Manuals or Booklets	193	81.4	44	18.6
Worksheets	205	86.5	32	13.5
Transparencies	155	65.4	82	34.6
Microcomputer Programs	26	11.0	211	89.0
16mm Films	56	23.6	181	76.4
Videotapes	173	73.0	64	27.0
Slides or Filmstrips	109	46.0	128	54.0

Table 3. *Personal Safety Equipment Made Available for Student Use in Texas Agricultural Science Programs.*

	Available		Not Available	
Safety Equipment	n	%	n	%
Industrial Quality Eye Protection	230	97.0	7	3.0
Hearing Protection-Ear Plugs	40	16.9	197	83.1
Hearing Protection-Ear Muffs	18	7.6	219	92.4
Hard Hats	23	9.7	214	90.3
Bump Caps	8	3.4	229	96.6
Welding Gloves	234	98.7	3	1.3
Welding Aprons or Jackets	128	54.0	109	46.0
Shop Coats or Overalls	122	51.5	115	48.5
Respirators	64	27.0	173	73.0
Dust Masks	95	40.1	142	59.9
Steel Toed Shoes	4	1.7	233	98.3

Respondents were also asked to respond concerning safety practices and equipment found in their agricultural mechanics laboratories. As seen in Table 4, nearly all teachers participating in this study indicated that their laboratories were equipped with fire extinguishers (n = 234, 98.7%). However, 27 respondents (11.4%) reported that they did not have first aid kits in their laboratory.

Respondents were asked to rate the importance of various agricultural mechanics safety instructional topics or practices. A value of 5 was assigned to the variables rated as having much importance and a value of 1 was assigned to the variables rated as having little importance. Table 5 presents a rank order listing of these various topics or practices according to rated importance. The most highly rated topic or practice according to importance was the "Safe Operation of Power Tools" (mean = 4.75). Others with similarly high ratings were "Industrial Quality Eye Protection" (mean = 4.64) and "Safe Use of Hand Tools" (mean = 4.62). Of least importance to the responding teachers was "Color Coding of Shop Tool" (mean = 2.90).

Table 4. *Safety Practices and Equipment Used in Texas Agricultural Mechanics Laboratories.*

	Used		Not Used	
Safety Practices or Equipment	n	%	n	%
Safety Zones Around Tools	158	66.7	79	33.3
Power Tools are Color Coded	88	37.1	149	62.9
Non-Skid Area Around Power Tools	8	3.4	229	96.6
Safety Posters Near Power Tools	158	66.7	79	33.3
Eye Safety Regulations are Posted	187	78.9	50	21.1
Safety Cabinet for Flammable Liquids	115	48.5	122	51.5
First Aid Kit	210	88.6	27	11.4
Fire Alarm	101	42.6	136	57.4
Fire Blanket	38	16.0	199	84.0
Safety Cans for Flammable Liquids	95	40.1	142	59.9
Safety Guards on All Equipment	183	77.2	54	22.8
Fire Extinguishers	234	98.7	3	1.3
Welding Exhaust System	196	82.7	41	17.3
Welding Booths With Screens or Curtains	184	77.6	53	22.4
Vehicle Safety Stands	78	32.9	159	67.1
Exits Marked	164	69.2	73	30.8
Eye Wash	87	36.7	150	63.3

Table 5. *Importance of Agricultural Mechanics Safety Instructional Topics or Practices.*

Rank	Instructional Topic or Practice	Mean	S.D.
1	Safe Operation of Power Tools	4.75	0.59
2	Industrial Quality Eye Protection	4.64	0.69
3	Safe Use of Hand Tools	4.62	0.68
4	Electrical Safety	4.48	1.09
5	Welding Exhaust Systems	4.31	0.86
6	Administer Safety Exams	4.26	1.04
7	Fire Extinguisher Types	4.25	0.96
8	First-Aid Materials	4.24	0.95
9	Engine Exhaust Systems	3.95	1.24
10	Clean-up Schedules	3.57	1.15
11	Laboratory Safety Inspections	3.41	1.18
12	Power Tool Safety Posters	3.14	1.09
13	Texas Safety Laws	3.13	1.16
14	Accident Report Forms	3.06	1.27
15	Color Coding of Shop Tools	2.90	1.11

Responding teachers were also asked to rate how well prepared they were to provide safety instruction related to various instructional topics and practices. They responded on a five point scale with 5 being "very well prepared" and 1 being "poorly prepared." Table 6 shows a rank order listing of the various instructional topics and practices. The similar topics of "Safe Use of Hand Tools" and "Safe Operation of Power Tools" received mean ratings of 4.30 and 4.26

respectively. Teachers indicated that they were only somewhat prepared to present "Texas Safety Law" (mean 2.53).

Table 6. *Preparedness of Agricultural Science Teachers to Present Agricultural Mechanics Safety Instructional Topics or Practices.*

Rank	Instructional Topic or Practice	Mean	S.D.
1	Safe Use of Hand Tools	4.30	0.81
2	Safe Operation of Power Tools	4.26	0.81
3	Industrial Quality Eye Protection	4.07	1.05
4	Fire Extinguisher Types	3.97	1.09
5	Welding Exhaust Systems	3.79	1.24
6	Electrical Safety	3.77	1.06
7	Clean-Up Schedules	3.71	1.19
8	First-Aid Materials	3.64	1.11
9	Laboratory Safety Inspections	3.39	1.18
10	Power Tool Safety Posters	3.35	1.30
11	Color Coding of Shop Tools	3.32	1.26
12	Engine Exhaust Systems	3.00	1.44
13	Administering Safety Exams	2.91	1.09
14	Accident Report Forms	2.86	1.39
15	Texas Safety Laws	2.53	1.01

CONCLUSIONS AND RECOMMENDATIONS

Texas secondary agricultural science teachers are using recommended safety practices and are providing student safety and emergency equipment but not to the extent warranted by the hazards present in the agricultural mechanics laboratory. This conclusion is consistent with the results of similar studies in Missouri (Lamb, 1984), Nebraska (Rudolph and Dillon, 1984), Ohio (Gleim and Hard, 1988), Iowa (Hoerner and Kessler, 1989), and Mississippi (Johnson and Fletcher, 1990).

Based on the results of this study, it is apparent that unsafe conditions exist in many Texas secondary agricultural mechanics laboratories. Safety program improvement must become a top priority for agricultural educators in Texas.

The following recommendations are based on the findings of this study:

1. Teacher educators and state supervisors should emphasize agricultural mechanics safety during local program visits. Recommendations for safety program improvements should be made and progress should be monitored.
2. Inservice programs on agricultural mechanics safety should be planned and conducted. The programs should focus on how to plan and implement comprehensive agricultural mechanics safety programs.
3. Preservice agricultural education programs in Texas should be examined to determine if additional emphasis should be placed on safety in agricultural mechanics.
4. Funds should be made available for use in purchasing safety and emergency equipment items.
5. Research should be conducted to determine factors which prevent teachers from using recommended safety practices in agricultural mechanics.
6. Research should be conducted to assess the levels of safety compliance in Texas agricultural mechanics laboratories.

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AN ANALYSIS OF AGRICULTURAL MECHANICS SAFETY PRACTICES IN TEXAS AGRICULTURAL SCIENCE PROGRAMS

A Critique

Carl L. Reynolds, University of Wyoming--Discussant

This particular study, to identify safety practices followed by secondary agricultural science teachers is a valuable addition to the research knowledge related to safety in agricultural education programs.

Again, the development of the construct, the statement of the purpose and objectives and the procedures were clearly stated in a brief but concise manner. The researcher is to be commended for following approved practices in sampling the population and revising and testing the instrument that had been used in previous research efforts.

It was not mentioned whether a follow up of nonrespondents was conducted although I am confident that the analysis of late respondents reduces considerably any threat of validity to the results.

In the results it was reported that teachers do a good job of teaching safety through demonstrations and use of safety tests. However it was of concern that a small group (30.8%) reported they employ scheduled safety inspections. Since this practice is one that is most commonly used in industry, it merits considerable attention. Another concern was triggered by the reported low use of hearing protection (24.5%) especially since a considerable amount of research has been conducted recently by the agricultural education profession in this area.

Overall, I was pleased with the quality of the research and commend the researcher for this fine effort. It is the type of research that is continually needed to maintain an awareness among teachers, teacher educators, and state supervisors of the work to be done to establish safe environment for our students.

HOW SAFE ARE VOCATIONAL EDUCATION LABORATORIES?

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INTRODUCTION

> When public school administrators first undertook the obligation of providing shop and laboratory experiences for youth and adults enrolled in their schools, they assumed a responsibility to provide an accident-free environment and a program of instruction which would include emphasis on effective safety practices (Williams, 1975, p. 50)

As school curricula have expanded to include more occupational and technical subjects, the potential for situations that contribute to accidents has increased (Kigin, 1983; Ramp, Johnson, & McLuckie, 1975). What are schools doing to ensure a safe environment for students? In a survey of administrators and vocational teachers in Missouri, Dyrenfurth and Lindhart (1981) found that classroom and laboratory instruction were most often cited as the major safety program activities.

Agricultural education researchers (Bruening, Hoover, & Radhakrishna, 1991; Fletcher & Johnson, 1990) have surveyed agricultural mechanics teachers to determine the extent to which selected safety practices were utilized and to determine the availability of selected safety materials and equipment. Although teachers have the primary responsibility for ensuring the safety of vocational students, teachers will have difficulty meeting this responsibility without the support of school administrators (Bear, 1980; McMahon, 1975). Therefore, it becomes important to use administrators as the subjects of safety investigations.

What are the potential consequences of neglecting the safety needs of occupational programs? Connors (1981) wrote that "we do live in a litigious society, and educators as public servants are increasingly frequent targets of litigation" (p. ix). Additionally, many schools no longer have sovereign immunity and may be held liable for accidents in negligence suits (Godbey, 1979; La Morte, 1990). Therefore, it is increasingly important for educators to properly maintain equipment, provide instruction in safety, and adequately supervise students engaged in laboratory activities (Connors, 1981). Although the threat of injury and litigation are real, there is a need for objective data to assess the magnitude of the threat.

PURPOSE AND OBJECTIVES

The purpose of this descriptive correlational study was to investigate the utilization of accepted safety practices, the availability of safety materials and equipment, the prevalence of accidents, and the extent to which schools have been engaged in litigation resulting from student injury. The research objectives were to:

1. Describe safety practices used by vocational teachers in comprehensive high schools with agricultural education programs as reported by school administrators.
2. Describe what safety materials and equipment are available in vocational laboratories in comprehensive high schools with agricultural education programs.
3. Describe and compare the number of accidents resulting in student injury by location over a two year period in comprehensive high schools with agricultural education programs.
4. Determine the number of lawsuits brought against educators as a consequence of school accidents over a two year period that were settled in favor of students and the amount of settlement.
5. Determine the number of schools providing liability insurance for faculty members and the average amount of coverage.
6. Describe relationships among selected indicators of safety and the number of accidents occurring in vocational laboratories.

PROCEDURES

The population for this descriptive survey included all principals of comprehensive high schools with agricultural education programs in Ohio (N = 260). The Ohio Directory of Agricultural Education was utilized to develop the list of comprehensive high schools with agricultural education programs. Based upon Krejcie and Morgan's (1970) formula for a 5 % margin of error a random sample of 155 schools was drawn.

The questionnaire utilized in this study was developed by the researchers. The questionnaire consisted of three parts including the administrator's safety attitude, policies, and facilities and inspection. Content and face validity were established by a panel of experts consisting of faculty and graduate students in the departments of Agricultural Education and Agricultural Engineering at The Ohio State University. Cronbach's Alpha was used to assess the reliability of part one (The Administrators' Safety Attitude) of the questionnaire. The reliability coefficient was .73. Since items in parts two and three requested factual responses, reliability was not estimated.

The questionnaire along with a cover letter and stamped return envelope were sent to all principals of comprehensive high schools with agricultural education programs included in the sample. Approximately four weeks after the initial mailing a second complete package including the questionnaire, a cover letter, and a stamped return envelope was sent to all non-respondents. The response rate was 83%. Non-response error was controlled by comparing early to late respondents (Miller & Smith, 1983). No significant differences were found between early and late respondents. Although each package was addressed to the principal, some of the respondents were vocational administrators. Therefore, respondents were referred to as administrators.

ANALYSIS OF DATA

All data were analyzed using the Statistical Package for the Social Sciences, Personal Computer Version (SPSS/PC+). Appropriate statistical procedures for description (frequencies, percents, means, standard deviations, pearson correlations, and Spearman correlations) and inference (repeated measures analysis of variance and the

Tukey post-hoc procedure) were used. The alpha level was set a priori at .05. All correlation coefficients were interpreted utilizing Davis' (1971) descriptors.

RESULTS

Administrators in 100% (128) of the schools indicated that teachers instruct students in how to properly use equipment and demonstrate proper use of equipment. Additionally, vocational teachers in 97.7% (125) of the schools give an equipment test to students (Table 1).

Only 46.1% (59) of the administrators reported that pupils were required to sign a safety checklist. Additionally, administrators in 57.1% (72) of the schools reported that vocational teachers permit only one dangerous activity at a time and closely supervise it. According to administrators, vocational teachers never leave the shop while students are using equipment or chemicals and evaluate pupils every year regarding proper use of equipment in 84.4% (108) of the schools (Table 1).

Table 1
Teacher Safety Practices

Practice		f	%
1.	Maintains equipment.	127	99.2
2.	Instructs pupils in how to properly use equipment.	128	100.0
3.	Gives pupils an equipment test.	125	97.7
4.	Makes sure that pupils understand what is wrong with incorrect answers on the equipment test.	115	89.8
5.	Demonstrates proper use of equipment.	128	100.0
6.	Each student demonstrates proper use of equipment in the presence of the teacher.	116	90.6
7.	Evaluates each pupil every year regarding proper use of equipment.	108	84.4
8.	Enforces the constant use of safety glasses when appropriate.	126	99.2
9.	Requires pupils to dress appropriately for each activity.	121	95.3
10.	Requires pupils to sign a safety checklist each year.	59	46.1
11.	Balances the danger of an activity against its educational value.	112	88.2
12.	Only permits one dangerous activity at a time and and supervises it closely.	72	57.1
13.	Does not allow pupils to use unsafe equipment.	125	97.7
14.	Never leaves the shop while students are using equipment or chemicals.	108	84.4
15.	Stresses safety above all else.	114	89.1

More than 90% of the administrators reported that the following safety materials and equipment were available in their schools' vocational laboratories; fire extinguishers, exits marked, fire alarm, and safety guards on all equipment (Table 2). On the otherhand, fewer than 50% of the administrators reported the availability of the following safety materials and equipment in their vocational laboratories; color coded power tools, non-skid areas around power tools, fire blanket, safety cabinets for explosive materials, and vehicle safety stands (Table 2).

Table 2
Safety Materials and Equipment Available in Vocational Laboratories

Item		f	%
1.	Safety zones around power tools.	95	74.2
2.	Color coded power tools.	42	33.6
3.	Non-skid areas around power tools.	26	20.8
4.	Safety rules posted near power tools.	107	85.6
5.	Ohio eye safety law posted.	90	71.4
6.	First aid kit.	111	88.1
7.	Fire blanket.	62	49.2
8.	Fire alarm.	119	94.4
9.	Exits marked.	122	96.8
10.	Safety cabinets for explosive materials.	58	46.4
11.	Safety cans for flammable liquids.	86	68.3
12.	Safety guards on all equipment.	116	92.8
13.	Fire extinguishers.	123	97.6
14.	Welding exhaust system.	104	83.2
15.	Welding booths have screens/curtains.	107	85.6
16.	Vehicle safety stands.	47	37.9

The average number of accidents resulting in student injury occurring in vocational laboratories over a two year period was 1.5 with a standard deviation of 2.35 (Table 3). Table 3 further shows that three or fewer accidents resulting in student injury occurred in 90% of schools over a two year period.

Table 4 compares the number of accidents resulting in student injury over a two year period by location. On average administrators reported 1.5 accidents in vocational laboratories, 4.96 accidents in physical education courses, .39 accidents in science laboratories, and .87 accidents in other areas (i.e. classrooms, hallways, cafeteria, and stairs). Repeated measures analysis of variance and the Tukey post hoc procedure revealed that the number of accidents in physical education courses was significantly greater than the number of accidents occurring in vocational laboratories, science laboratories, and other areas.

Table 3
Vocational Laboratory Accidents Resulting in Student Injury Over a Two Year Period

No. of Accidents	f	%
0	57	47.5
1	15	12.5
2	27	22.5
3	9	7.5
4	4	3.3
More than 4	8	6.7

Mean 1.5 Std. Dev. 2.35

Table 4
Number of Accidents Resulting in Student Injury Over a Two Year Period by Location

	Vocational Laboratories	P. E. Classes	Science Laboratories	Other Locations	F	p
Mean	1.50^a	4.96^b	$.39^a$	$.87^a$	33.83	.001*
St. Dev.	2.36	6.19	.88	2.98		

Note. Means with different letters differ significantly.

Further analysis revealed that accidents occurring in vocational laboratories, physical education classes, science laboratories, and other areas accounted for 22.36%, 65.29%, 3.60%, and 8.75% of the total number of school accidents respectively.

Of those administrators providing useable data, 4% (4) reported that one lawsuit had been filed as a result of school accidents occurring over the last two years. Two lawsuits were decided in favor of students. One settlement was for $150,000 while the other was for $500,000.

Of those administrators providing useable data, 82.4% (103) indicated that their school provided liability insurance for faculty. Of the schools providing liability insurance 78.1% (75) had policy amounts in excess of $200,000 (Table 5).

Pearson correlations and Spearman correlations were calculated to describe relationships between selected indicators of safety in vocational laboratories. Coefficients ranged in magnitude from negligible to moderate. The administrators' perception of vocational teachers' preparedness to provide safety instruction was significantly related to the administrators' safety attitude, and the administrators' competence in determining whether or not a vocational laboratory is safe. Furthermore, the administrators' safety attitude was significantly related to the number of safety materials and equipment available, and the number of teacher safety practices utilized.

Additionally, the administrators competence in determining whether or not a vocational laboratory is safe was significantly related to the number of safety materials and equipment available and whether or not administrators inspect vocational laboratories for safety. The number of accidents occurring in vocational laboratories was not significantly related to any of the selected indicators of safety (Table 6).

Table 5
Liability Insurance for Faculty Members

Policy Amount	f	%
$25,000 to $49,999	1	1.0
$50,000 to $99,999	4	4.2
$100,000 to $149,999	14	14.6
$150,000 to $199,999	2	2.1
More than $200,000	75	78.1

Table 6
Relationships Among Selected Indicators of Safety in Vocational Laboratories

	Intercorrelations						
Variables	X1	X2	X3	X4	X5	X6	X7
Vocational Teacher (X1) preparedness to provide safety instruction.	1.00	.24*	.13	.18	.01	.20*	.10
Administrators' safety (X2) attitude.		1.00	.22*	.31*	.04	.06	.09
Number of safety materials (X3) and equipment available.			1.00	.10	-.01	.22*	-.04
Number of teacher safety (X4) practices utilized.				1.00	-.05	.09	-.14
Administrators' inspect (X5) facilities for safety.					1.00	.26*	-.18
Administrator competence in (X6) determining whether a vocational laboratory is safe.						1.00	-.18
Number of accidents in (X7) vocational laboratories.							1.00

* $p < .05$

CONCLUSIONS AND/OR RECOMMENDATIONS

According to school administrators, vocational teachers use many of the safety practices espoused in the literature on laboratory safety. Most encouraging is the fact that all administrators reported that vocational teachers instruct pupils in how to properly use equipment and demonstrate proper use of equipment. There remains room for improvement on other teacher safety practices, however. Teacher educators should make certain that preservice teachers appreciate the importance of each practice, and develop ongoing strategies for reinforcing the use of these safety practices by practicing teachers.

The nonexistence of several safety materials and/or equipment in many vocational laboratories is discouraging. For example, approximately 12% of the administrators reported that first aid kits were not available in vocational laboratories. Additionally, many inexpensive safety materials (color coded power tools, safety zones around power tools, and safety cans for flammable liquids) were not available in some schools. Other materials and/or equipment (safety guards on equipment, welding exhaust systems, and safety cabinets for explosive materials) were not available in some schools.

The administrators' attitude toward safety was significantly related to both the number of safety materials and equipment available and the number of teacher safety practices utilized. Therefore, it becomes important that efforts be made to create more positive safety attitudes in public school administrators. Administrators must be convinced of their legal and moral obligation to provide for the safety of students and teachers under their supervision.

Vocational education laboratories are relatively safe when one considers the nature of the laboratory environment. On average, administrators reported less than one vocational laboratory accident per year that resulted in student injury. On the otherhand, vocational accidents accounted for more than 20% of the total number of school accidents which is considerably more than the 9% estimate made by Ramp et. al. (1975).

Over a two year period only four lawsuits were filed of which two were settled in favor of students. The fear of negligence suits may be exaggerated. Even so, teachers in 82% of the schools were provided liability insurance and most policies amounts were in excess of $200,000. One should consider the possibility that liability insurance may actually encourage lawsuits. La Morte (1990) wrote that "although a strong case for liability may be made against them, impecunious and uninsured educators are unlikely candidates for suit" (p. 403).

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HOW SAFE ARE VOCATIONAL LABORATORIES?

A Critique

Carl L. Reynolds, University of Wyoming--Discussant

This study is an excellent complement to the previous two studies we have just heard. It is not often that we are able to fit several pieces of the puzzle together in one session to the degree that has been accomplished today. I am delighted that we are able to compare the results of studies to identify safety practices employed as reported by teachers and by administrators.

Again, the researchers are to be commended for their careful attention to detail in establishing the theoretical base, stating the purpose, and following appropriate procedures in conducting this study. The statistical analysis was appropriate for the nature of the data collected.

The results of safety practices reported parallels that of the Texas study with administrators reporting that teachers do an excellent job of employing demonstrations and safety tests. The fact that administrators reported some weak areas such as safety equipment is a valid concern. But, it is likely that the process of administrators completing the survey increased their awareness that could well result in improvement of safety conditions in their schools.

The conclusion was well stated that since administrators attitudes and safety materials/equipment available is related to the number of safety practices used by teachers, then the task is to focus on developing more positive safety attitudes by administrators. It may well be valuable time spent to discuss ways in which this attitude improvement can best be accomplished.

Another interesting point raised was over the issue of how much liability protection should be provided and whether the level of protection raises or lowers the incidence of lawsuits. This item should be debated in light of the moral and ethical responsibilities for agricultural educators to promote a safe working environment for their students.

Overall, the researchers are to be commended for a well conducted study that provides a most valuable contribution to the research knowledge in safety education.

EVALUATION OF NOISE IN VOCATIONAL EDUCATION LABORATORIES

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INTRODUCTION

The majority of vocational educators do not recognize the risk which noise poses to their students or themselves. Teachers lack basic information about the exposure levels of noise they and their students experience in the instructional laboratories. Studies completed by Bear (1969), Madou-Bangurah (1978), Shell (1972), Wall and Jessee (1971), and Weston and Stewart (1980) demonstrated that noise levels in vocational education laboratories often exceeded the safety limits for noise set by OSHA. Although these studies made recommendations based upon OSHA standards concerning the maximum time students should operate specific machines, none of them provided measurements to confirm teacher and student exposures to direct and indirect noise sources over the period of class attendance.

PURPOSE AND OBJECTIVE

In order to fill this information vacuum and to prevent risk from noise exposure to vocational education students and instructors, the following objective was addressed:

To measure student and teacher percent noise dose in a representative sample of vocational education laboratories under controlled noise conditions.

PROCEDURES

This study was conducted as descriptive research with survey data collected on site by researchers. The accessible population included all students enrolled and teachers of programs in the areas of Agricultural Education Trade and Industrial Education, and Industrial Arts Education at the secondary school level. Approximately 38,547 students were enrolled in these programs during the time of data collection.

The target population included secondary school students enrolled in Agricultural Education, Trade & Industrial Education, and Industrial Arts programs in two predominately urban counties where welding was specified as a part of the curriculum or the major emphasis of the course. From the 54 programs in the target counties which offered welding, a proportional stratified random sample consisting of 50% of the programs (27) was selected.

After schools were identified, school administrators and teachers were contacted by letter and their participation solicited. Based upon the results of these contacts, specific schools were selected by the researcher for on-site visitation and the collection of data. The total number of schools meeting the criteria and agreeing to participate were 21 schools with 21 teachers, and 88 students. One school was dropped from the statistical analysis portion of the study because of a deliberate effort on the part of the teacher to influence the results. This interference was motivated by a clear need for new facilities and a reluctant school board. Results therefore are based upon 20 schools, 20 teachers and 84 students.

The researcher specified the activity to be conducted during the collection of data. Arc welding in the flat position is a common activity in all vocational education programs emphasizing welding. A common basic weld was assigned to the students in the class during the data collection phase. Each teacher conducted supervised practice on the preparation and construction of a padding plate using stick electrode (E6011) on mild steel plate 1/4 inch in thickness. To limit variability, the researcher provided electrodes and metal for the exercise. Depending on the number of students in the class, all arc welding machines of the stick type were operated during the measurement period. All existing exhaust equipment was operated during data collection.

Data Collection

Five students were randomly assigned to wear a dosimeter and data storage unit. The teacher was provided with a dosimeter and data storage unit. Random assignment of students to dosimeters reduced variability among students in performing variations in welding and grinding techniques.

Equipment

The randomly assigned students and each teacher wore a Larson Davis Model 700 Dosimeter with memory. The following information was collected: Dose = Percentage of dose of an allowable 8 hour exposure received, Projected 8 hour exposure % = Projected 8 hour exposure at this noise level, SEL = Single event level or sound exposure level (3dB exchange rate), LVL = Integrated noise level (or at 3dB exchange rate = LEQ), Lmin = Minimum sound pressure level (SPL), Lmax = Maximum SPL.Lpk = Largest reading. RMS EX = Number of times SPL exceeded 90dB.Pk Ex = Number of exposures over 140dB.

All wearer accessible controls were locked out to prevent the student/ teacher using the unit from influencing the results.

RESULTS

Tables 1 and 2 present the student and teacher exposure data. Table 3 presents the percent dose students received during the 15-minute welding noise exposure. A total of 48 students were between 0 and 5% of the dose described by the threshold level of 80dB. One student received 45% or more of the dose at a criterion level of 90dBA. In other words, this student received 45% of the daily recommended dose for 8 hours in a 15-minute exposure to welding noise.

Table 1
Student Noise Exposure During a 15-Minute Welding Period (PARTIAL TABLE)

				LEVEL dB					RMS	Pk
Sch	Teach.	Dose %	Projected 8hr Exp. %	SEL	VL	MIN	MAX	PEAK	EXC	Ex
1	1	7.4	222.0	123.5	93.7	60.0	109.0	140.5	34	1
1	2	6.0	178.0	122.6	92.8	63.0	108.0	143.0	51	1
1	3	4.3	71.5	121.3	88.8	55.5	105.5	132.5	17	0
1	4	2.4	71.0	118.7	88.7	57.0	102.0	134.0	24	0
2	1	8.3	262.0	124.1	94.4	73.0	109.0	130.5	27	0
2	2	2.5	80.0	118.9	89.3	72.0	103.5	126.5	19	0
2	3	11.5	358.0	125.4	95.8	75.5	108.5	132.0	26	0
2	4	17.2	528.0	127.2	97.4	71.5	116.0	140.5	41	1
3*	1	336.0	10304.0	140.0	110.4	78.0	117.5	144.5	4	1
3*	2	375.0	10880.0	140.6	110.6	76.5	122.5	142.5	4	4

Dose = Percentage of dose of an allowable 8 hour exposure received. Projected 8hr exposure % = Projected 8 hour exposure at this noise level. SEL = Single event level or sound exposure level (3dB exchange rate). LVL = Integrated noise level (or at 3dB exchange rate = LEQ). Lmin = Minimum sound pressure level (SPL). Lmax = Maximum SPL. Lpk = Largest reading. RMS EX = Number of times SPL exceeded 90dB. Pk Ex = Number of exposures over 140dB. *This data was dropped from the study for regression analysis due to researchers observation that noise measured was not a result of routine class activities.

Table 2

Teacher Noise Exposure During a 15-Minute Welding Period

				LEVEL dB						
Sch	Teach.	Dose %	Projected 8hr Exp. %	SEL	VL	MIN	MAX	PEAK	RMS EXC	Pk Ex
1	1	5.6	136.0	122.1	91.4	65.4	109.4	133.1	60	0
2	2	0.7	65.3	113.4	88.3	58.4	99.9	116.9	18	0
3*	3	632.0	19999.0	142.6	113.1	80.7	121.2	136.9	4	0
4	4	7.6	134.5	123.4	91.3	60.4	110.9	126.1	74	0
5	5	3.3	56.8	119.9	87.6	54.4	104.9	118.7	55	0
6	6	.4	8.3	112.2	80.5	66.4	96.4	128.1	9	0
7	7	4.1	101.8	120.8	90.1	59.9	110.4	130.1	49	0
8	8	2.4	31.6	118.8	85.2	57.2	100.7	126.1	49	0
9	9	2.3	58.4	118.3	87.6	63.4	101.9	117.0	43	0
10	10	9.4	79.7	113.4	81.1	64.9	95.9	118.0	16	0
11	11	1.3	39.0	116.1	86.1	63.9	100.4	130.1	25	0
12	12	1.6	86.8	116.7	87.0	54.9	103.9	135.1	35	0
12	12	1.1	30.4	115.3	85.1	57.4	101.4	118.0	16	0
13	13	1.4	47.9	116.3	86.9	67.4	99.9	134.1	46	4
14	14	4.8	118.0	121.4	90.7	63.6	102.6	125.1	50	0
15	15	4.8	118.0	121.4	90.7	63.6	102.6	125.1	50	0
16	16	2.6	47.3	119.0	86.9	62.3	102.8	121.7	46	0
17	17	2.3	48.1	118.4	86.9	51.6	103.6	121.0	65	0
18	18	3.2	52.1	119.8	87.3	53.9	102.9	132.1	62	0
19	19	3.4	92.0	120.0	89.6	64.6	106.6	126.1	43	0
20	20	1.4	34.0	116.4	85.5	52.9	98.6	122.1	27	0
21	21	1.8	42.9	117.3	86.4	66.0	105.0	141.1	29	1

Table 3

Histogram of Percentage of Dose Received by Students at a Criterion Level of 90dBA, Threshold level of 80dBA, and a 3dB Exchange Rate Over a 15-Minute Welding Noise Exposure N = 104

Percent	Student Count	
0	48	**
5	40	**
10	10	**********
15	1	*
25	3	***
40	1	*
45	1	*

Note: 0 indicated dose was between 0 and 5% dose.

Table 4 presents the same student/teacher exposures extended through calculation to the exposure which a student/teacher would have accumulated if the exposure was continued at the same level for 8 hours. Thirty-one students would not have exceeded the OSHA recommended dose of 90dB for an 8-hour exposure. The remainder of the 104 students/teachers measured would have been at the recommended exposure level or would have exceeded it. One student would have exceeded the 8 hour recommended exposure by 12000%.

Table 4
Histogram of Percentage of OSHA Recommended Dose Received in 15-Minute Welding Exposure Calculated on an 8-Hour Exposure Basis Assuming Continuation of Noise at Level Measured N = 104 Each * represents 2 obs.

Percent Dose	Student Count	
0	31	****************
100	53	***************************
200	12	******
300	1	*
400	1	*
500	1	*
700	2	*
900	1	*
1000	1	*
1200	1	*

Note: 0 indicates that 31 students did not exceed the OSHA recommended dose of 90dB for an 8-hour exposure.

CONCLUSIONS AND RECOMMENDATIONS

Summary of Findings

Student and teacher doses are significant based upon the measurements taken. Of the 104 students and teachers measured, 73 would meet or exceed the OSHA recommended dose if the same exposure measured were continued over an 8- hour period. This fact, when combined with other potential environmental noise in this age group, gives rise for concern. On an unweighted scale, one student experienced a noise level of 144dB. There were a total of six instances where a student or teacher exceeded 140dB.

Conclusions

Some students and teachers are routinely receiving potentially damaging noise doses while welding in vocational education laboratories. The magnitude of this damage cannot be estimated due a lack of knowledge of the exposure of students and teachers to noise outside of the shop environment. It is clear that if the welding activity measured was continued for 8 hours, 70 percent of the students and teachers would exceed OSHA recommended levels of exposure.

Recommendations

In light of the findings of this study, the following recommendations are made:

1. Students and teachers must be routinely provided with hearing protection devices.
2. The need for hearing protection devices must be included as a component of safety instruction just as eye protection has been included.

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EVALUATION OF NOISE IN VOCATIONAL EDUCATION LABORATORIES

A Critique

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The objectives of this study, to establish a more accurate base of knowledge on levels of noise exposure in high school welding laboratories for students and their teachers, is a valuable contribution for which the researchers are to be commended.

The design, the sampling and the procedures for establishing the controlled environment were appropriately selected. The researchers are to be commended for being alert to the deliberate attempt by one teacher in a school to influence the results.

It was of real interest to note the number of students who received less than the OSHA recommended dose compared with those who were exposed to the equivalent of 100 percent or more of the maximum allowable dose projected to an 8-hour day. In recalling some recent research in which a welding laboratory was monitored over the period of a semester, the results of this particular research are much higher. Realizing that space limitations prevent full discussion of the procedures followed, it would be helpful to know how the researchers controlled for common practices followed such as slag removal, machine settings, grinding/cleaning operations, and machine state or repair. Since in one case it was determined that deliberate attempts to taint the results were discovered would it not be feasible to think that other students in the study would have had similar thoughts?

Another item for debate is the length of the noise monitoring time period. Is a fifteen minute time period a realistic sample of noise dosage that would occur at the same level over an eight hour day?

Having had experienced a partial hearing loss in one ear, I am personally grateful that these researchers have explored and reported upon a safety area that is of real concern. I strongly encourage discussion on this topic that will aid these researchers and others in the profession in continuing to improve upon noise exposure research that may require OSHA to reexamine their maximum exposure levels.

ENTRY YEAR AGRICULTURAL EDUCATION TEACHERS' AND ENTRY YEAR ASSISTANCE COMMITTEE MEMBERS' PERCEPTIONS OF THE OKLAHOMA ENTRY YEAR ASSISTANCE PROGRAM

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INTRODUCTION

Intent of the Entry Assistance Program

The Entry Year Assistance program (EYAP) in Oklahoma was put into place as a result of State House Bill 1706 in 1980 (a part of the 1980 Oklahoma Teacher Education Reform movement). The intent of HB 1706 was to establish qualifications of teachers in the accredited schools of Oklahoma through licensing and certification requirements to ensure that education of the children of Oklahoma will be provided by teachers of demonstrated ability. Furthermore, this law requires the licensed teacher to participate in the EYAP during the initial year of teaching in an accredited school under the guidance and assistance of an Entry Year Assistance Committee in order to qualify for an Oklahoma Teaching Certificate. This has applied to all students completing an approved teacher education program and graduating after February 1, 1982. Note: (Other states may refer to this type of program as a "Teacher Induction Program" or "Mentoring Program").

Definition of the Entry Year Teacher

"Entry Year Assistance Committee" (EYT) is a licensed teacher who is employed in an accredited school and who has zero (0) years experience as a classroom teacher. The EYT's license to teach is valid for one academic year, only.

Definition of the Entry Year Assistance Committee

"Entry Year Assistance Committee" (EYAC) refers to a committee assigned to a local school district for the purpose of giving guidance and assistance, reviewing the teaching performance of an entry teacher, and making recommendations to the State Board of Education regarding certification. Members of the EYAC include: (A) Teacher Consultant [classroom teacher]; (B) Principal or other administrator designated by the local school board; and, (C) a Teacher Educator in a college or school of education of an institution of higher learning. Each of the committee members must independently observe the classroom teaching performance of the EYT a minimum of three times and the committee meets with the EYT a minimum of three times to discuss their observations (including the strengths and/or concerns the committee members may have) and conclusively makes recommendations. Categories of observation areas include (1) Human Relations, (2) Teaching and Assessment, (3) Classroom

Management, and (4) Professionalism. (Note: Upon completion of the EYT's first year of teaching the EYAC determines whether or not the EYT should be recommended for an Oklahoma Teaching Certificate).

Theoretical Framework and Need for the Study

In 1985 a study was conducted by Jerry Barbee and Eddy Finley of Oklahoma State University entitled, "Vocational Agriculture Entry Year Teachers' and Entry Assistance Committee Members' Perceptions of the Oklahoma Entry Year Assistance Program. "The Barbee/Finley (1985) research initiative continues to serve as a baseline for longitudinal research efforts regarding the Entry Year Assistance Program, particularly in the discipline of Agricultural Education. In order to acquire contemporary data, and as well, to conduct comparative analysis, the Barbee/Finley (1985) research was replicated.

Additionally, The Oklahoma State Regents for Higher Education requested the findings of this research (Barrera/Finley, 1991), among other input, to be utilized for evaluative purposes regarding continued funding of the Entry Year Assistance Program.

PURPOSE AND OBJECTIVES OF THE STUDY

The primary purpose of this study was to determine the Entry Year Agricultural Education Teachers' and Entry Year Assistance Committee Members' Perceptions of the Oklahoma Entry Year Assistance Program. The secondary purpose of this study was to compare the findings of this research to the baseline research conducted in 1985 by Jerry Barbee and Eddy Finley.

The results of this study should provide decision makers and leaders in the field of Education with valuable information regarding Entry Year Assistance Programs (or Teacher Induction Programs). Some states have implemented similar Teacher Induction Programs and many other states are considering fully implementing similar programs.

The major objectives of this study included:

1. To determine whether or not the Entry Year Assistance Program provided needed assistance to the Entry Year Teacher as perceived by the Members of the Entry Year Assistance Committee and the Entry Year Teachers;
2. To determine the level of importance of the Entry Year Assistance Program as perceived by the Entry Year Assistance Committee Members and the Entry Year Teachers;
3. To determine the major strengths and major problems of the Entry Assistance Program as perceived by the Entry Year Assistance Committee Members and the Entry Year Teachers;
4. To determine whether or not the Entry Year Assistance Committee Members and the Entry Year Teachers favored Continuance of the Entry Year Assistance Program; and,
5. To compare the findings of this research effort to the Barbee/Finley (1985) research findings.

PROCEDURES

Scope of the Study

The population of this study included 30 Entry Year Agricultural Eduction Teachers, 30 Teacher Consultants who were assigned by their principals to assist the Entry Year Agricultural Education Teachers, 30 Administrators who were selected by their local boards of education, and nine Teacher Educators from institutions of Higher Education with accredited Departments of Agricultural Education. In total, 99 participants were involved in the Entry Year Assistance Program as it relates to the Agricultural Education Teacher's first year of teaching. Of the total population, 96 (96.96%) responded to the 34 item telephone interview. Follow-up attempts were made to contact the remaining respondents (3.04%). However, of the 99 individuals eligible to be included in this study, one teacher consultant was deceased. One teacher consultant and one entry year agricultural education teacher could not be located to be interviewed. The list of the Entry Year Agricultural Education Teachers and the Entry Year Assistance Committee members, in both this research effort and the Barbee (1985) research, were obtained from several sources. The list of the Entry Year Agricultural Education Teachers and Entry Year Assistance Committee members for the academic years of 1988-89 and 1989-90 were obtained from the College of Education and the office of the Entry-Year Assistance Program Coordinator for Agricultural Education (OSU). A list of the 1988-89 and 1989-90 Entry Year Agricultural Education Teachers who graduated from Cameron State University and Panhandle State University and their Entry Year Assistance Committee members were obtained from their respective universities.

The scope of the Barbee/Finley (1985) study (to which statistical comparisons were made) included a total population of 212 EYAP participants. More specifically, the population included 67 Entry Year Vocational Agriculture Teachers, 67 Teacher Consultants, 64 Administrators, and 14 Teacher Educators from Oklahoma State University, Cameron University, and Panhandle State University. Of the 212, 205 (96.96%) responded to the telephone interview (Figure 1).

Design of Instrument Utilized

The research instrument developed by Barbee/Finley (1985) was used to conduct this study in order that an exact replication of questions could be asked and comparisons of responses could be made. The telephone survey instrument (Barbee/Finley, 1985) contained questions seeking quantitative information with regard to aspects of the Entry Year Assistance Program based upon the aforementioned purpose and objectives.

The Barbee instrument contained a list of general questions that were relevant to determining the perception of the Entry Year Assistance Program in agricultural education. These questions were derived from interviews with agricultural educational teachers who served under the Entry Year Assistance Program, and administrators, teacher consultants, and teacher educators who served on the Entry Year Assistance Committee for agricultural education teachers. After development of the initial instrument, the faculty of the Agricultural Education Department at Oklahoma State University reviewed it for content, applicability, and clarity. After receiving this input, revisions were made to strengthen the instrument.

Additionally, mock telephone interviews and pilot interviews consisting of individuals who were not included in the population for this study were utilized to assist in determining the validity and reliability of the instrument.

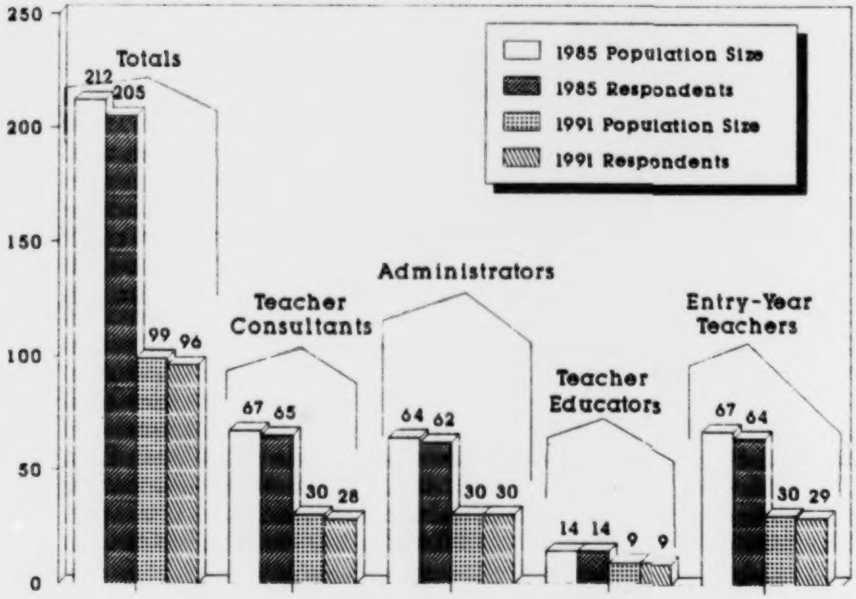

Figure 1. Comparison of Respondents by Profession

Collection of Data

The procedural conduct of this study was strictly congruent with that of the Barbee/Finley (1985) research initiative. However, deviations minimal in nature were purposely introduced in efforts to enhance a greater response rate. Prior to the actual telephone interview, postcards were mailed to the 99 Entry Year Agricultural Education Teachers and Entry Year Assistance Committee members describing the purpose of the study, approximately when they would be contacted, and eliciting their assistance. Another purpose for contacting the participants in this manner was to allow them time to consider relevant aspects of the forthcoming interview, which provided more accurate information for the study. More specifically, the study population was contacted and interviewed via telephone between the evening hours of seven and ten o'clock at their home. The purpose of contacting these individuals at this particular time was to hopefully ensure a more relaxed response, free of time constraints or other influences. Of the 99 respondents, 82 (82.82%) were contacted during the aforementioned time. The remaining 17 (17.18%) were contacted during the process of a school day.

ANALYSIS OF DATA

The statistical treatment utilized, with regard to this research, consisted of calculating frequency distributions and percentages. The responses to questions on the instrument were of two types: (1) Quantitative, which requested responses such as: Definitely Yes, Probably Yes, Uncertain, Probably Not, or Definitely Not, and questions which elicited a "Yes" or "No" response and (2) Qualitative, which offered the respondents the opportunity to elaborate their response based on the open-ended question asked. Chi square was utilized to determine whether of not significant differences existed between the findings of this research and Barbee/Finley (1985) research.

RESULTS AND/OR FINDINGS

1. The Entry Year Assistance Program was considered to be "very important" for the following reasons: (A) it created a feeling of security on the part of the Entry Year Teacher; (B) it provided information to the Entry Year Teacher with regard to his/her strength or weaknesses; (C) it provided an opportunity to improve teaching methods; and (D) it provided assistance needed to improve classroom management.
2. Major strengths of the Entry Year Assistance Program included: (A) moral support offered by the Entry Year Assistance Committee Members; (B) guidance in decision making; and (C) assistance provided by the Teacher Consultant. Furthermore, the majority of the respondents indicated that they perceived there to be "no major problems" regarding the Entry Assistance Program.
3. An overwhelming majority of the respondents perceived the observation/evaluation instrument (provided by the State Department of Education and utilized by the committee members) provided fair assessment indicators of the EYT's ability to teach.
4. The EYT's perceived they received the most assistance from their assigned Teacher Consultant. They further perceived their Administrators provided considerable assistance, as well.
5. An overwhelming majority of the respondents indicated they "strongly favored" the continuance of the Entry Year Assistance Program.
6. As compared to the Barbee/Finley (1985) research, there was a "significant difference" regarding whether of not the respondents "Strongly favored" the continuance of the Entry Year Assistance Program. In brief, there were other "significant differences"; however, the overall findings of this research as compared to the Barbee/Finley (1985) research were similar.

CONCLUSIONS AND/OR RECOMMENDATIONS

Based upon the findings of this research it was concluded that the respondents perceive the Entry Year Assistance Program to be of assistance to the Entry Year Teacher; and therefore, should be continued.

It was further concluded, based upon the findings, that the Entry Year Assistance Program provides a framework to enhance the morale of the Entry Year Teacher by: creating a feeling of security on the part of the Entry Year Teacher; providing information regarding the Entry Year Teacher's teaching strengths and weaknesses; and, provides assistance to improve classroom management.

A final conclusion, based upon the findings, is that there appears to be "No Major Problems" regarding the Entry Year Assistance Program.

Since there was a significant increase in the assistance provided by administrators, it is recommended that administrators continue their high level of providing assistance.

Based on the conclusions that the Entry Year Assistance Committee is very important to the Entry Year Teacher and that there is a strong support for the continuance of the Entry Year Assistance Program, it is highly recommended that the Entry Year Assistance Program be continued. It is further recommended, based upon the perceived importance of the Entry Year Assistance Committee that educational leaders, institutional decision-makers, as well as beginning teachers be made aware of this importance through means of documentation and/or orientation. It is further recommended that this dissemination of information include the following reasons why the Entry Year Assistance Program is important: creates a feeling of security on the part of the Entry Year Teacher, provides information to the Entry Year Teacher on his or her strengths or weaknesses, provides opportunity to improve teaching methods, and provides assistance needed to improve classroom management.

It is recommended that the evaluation/observation instrument, in its present format, continue to be used to assess the Entry Year Teachers' teaching abilities.

Implications

Based upon longitudinal evidence, States that do not have a "teacher induction or mentoring program" should give serious consideration to implementing one. These types of programs, particularly the Oklahoma EYAP, are proven to be advantageous to entry year or first year teachers. Furthermore, other implications of this research include the fact that it was utilized by the Oklahoma State Regents for Higher Education and was shared (upon request by the following agencies) with administrative personnel in the College of Education (OSU), College of Agricultural Sciences and Natural Resources (OSU), Oklahoma Department of Vocational-Technical Education's Division of Agricultural Education, and the Agricultural Education Departments at Cameron University and Panhandle State University (Oklahoma).

Finally, this research provided further evidence that as first year teachers grow and develop within their chosen profession, they need and appreciate guidance and assistance.

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ENTRY YEAR AGRICULTURAL EDUCATION TEACHERS' AND ENTRY YEAR ASSISTANCE COMMITTEE MEMBERS' PERCEPTIONS OF THE OKLAHOMA ENTRY YEAR ASSISTANCE PROGRAM

A Critique

Robert A. Martin, Iowa State University--Discussant

The focus of this study was to assess perceptions regarding the assistance program for beginning teachers of agriculture. Additionally it sought to compare findings to a previous assessment of the program. I found the study to be interesting in that it focused on an area that has received too little attention. It is good to see various states providing follow-up assistance for beginning teachers.

The procedures for this study were explained very thoroughly and appeared to be appropriate for the purpose of this research project. However, the paper had a very weak theoretical frame, a nearly nonexistent literature review, a very short section on the results/findings and a very long list of references of which few were cited in the paper. One reference was cited in the paper but not listed in the reference list. Also, there was no reference on this list for Barbee/Finley, 1985, but it was cited many times. Additionally, several grammar and spelling errors were noted by this reader. How was reliability established? There must be major revisions in this paper if it is to be seriously considered for wider distribution.

It is very difficult to discuss the merits of the findings of this study when they represent so little of the content of the paper. Nonetheless, I believe the issues raised by the researchers do merit careful consideration and debate. The following questions are posed in an attempt to generate discussion in the profession:

> Just because respondents say that a beginning teacher assistance program is good, does that make it so? Where is the performance evidence? What has changed as a result of the assistance? What specific outcomes support the need for the program? Perceptions are fine, but are they enough to make bottom-line decisions?
>
> What are "fair assessment indicators?" What indicators should be used to prove effectiveness in the teaching performance of beginning teachers. It appears that emphasis has been put on building morale in this study and some other studies which have been focused on beginning teachers. What specific morale factors are being emphasized and how can these be evaluated and factored into teacher performance and results? Should assistance programs be based solely on warm feelings and morale boosters or should they be based on strict performance and results or should a combination of these factors merit attention?

The researchers may be on to something but their focus needs refinement and specificity in these times of strict accountability. Do assistance programs for beginning teachers make a real difference? That is still an unanswered question, especially if all we can say is that we think it makes us feel good.

EXTENT OF USE OF THE PROBLEM-SOLVING APPROACH BY FIRST-YEAR TEACHERS OF AGRICULTURE

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INTRODUCTION

The problem-solving approach has long been advocated as an instructional approach best suited for teaching vocational agriculture (Crunkilton and Krebs, 1982; Hammonds, 1950; Newcomb, McCracken, and Warmbrod, 1986). Rosenfeld (1984) proposed that problem-solving teaching, in combination with supervised occupational experience and FFA activities, distinguishes the effectiveness of vocational agriculture programs from other vocational education programs.

Proponents contend that problem-solving teaching makes operational the major principles of effective teaching and learning (Warmbrod, 1970); that problem-solving teaching develops students' abilities to think, to evaluate, to draw inferences, and make decisions (Phipps, 1952); and that problem-solving teaching contributes to the ability to transfer knowledge to real life situations beyond the school (Crunkilton, 1984).

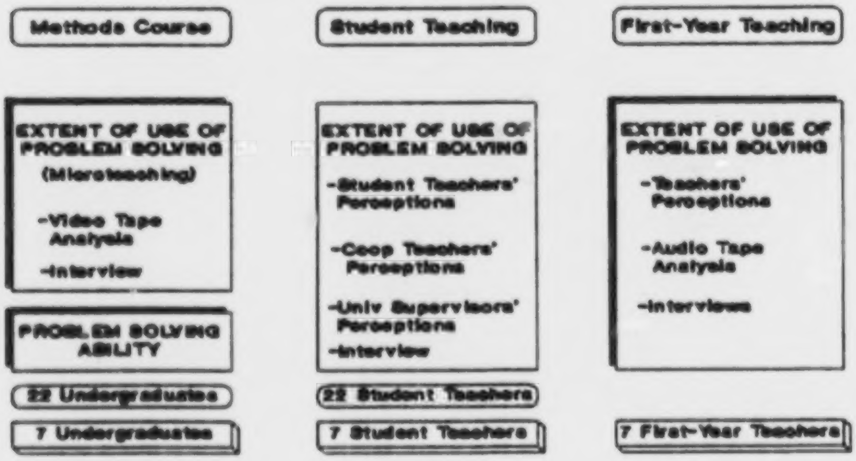
Moore and Moore (1984) debated the usefulness of problem-solving teaching asserting that its effectiveness is diminished since fewer students studying agriculture in secondary schools have either clearcut occupational goals in agriculture or appropriate supervised occupational experience projects -- both of which are basic to the effective use of problem-solving. Research concerning the effectiveness of problem-solving teaching is inconclusive and inconsistent; however, there is evidence that problem solving is effective when retention of knowledge is measured (Flowers and Osborne, 1986), that student teachers who use problem-solving teaching ask more higher order questions (Kirts and Stewart, 1983), and that students taught by teachers who use problem-solving teaching strategies exhibit higher levels of achievement and problem-solving ability (Chuatong, 1986).

Research reported in this paper is based on a model that places the teaching behaviors of first-year teachers in the context of two major elements of the preservice teacher education program -- the undergraduate methods of teaching course and student teaching (Figure 1). The rationale of the model is that first-year teachers' knowledge, skill, and use of problem-solving teaching is an artifact of their knowledge, skill, and extent to which they demonstrate problem-solving teaching in microteaching exercises in an undergraduate methods course and during student teaching.

Although research concerning the value of microteaching in the preservice teacher education program is mixed, evidence indicates that microteaching does contribute to the acquisition of desirable teaching skills (Borg et al., 1969; Legge and Asper, 1972; Peterson, 1973; Yeany, 1978). Student teaching, particularly the cooperating teacher, has a major impact on the teaching skills acquired and demonstrated by student teachers and later by first-year teachers (Price, 1961; Seperson and Joyce, 1973; Steeves, 1952; Yee, 1969).

Ronning, McCurdy, and Ballinger (1984) pointed out that individual differences among learners play a major role in explaining the extent to which problem-solving competence is acquired and used. It follows that the general problem-solving ability of undergraduates preparing to be teachers may influence the extent to which they demonstrate skill in using problem-solving teaching both during microteaching and as first-year teachers.

Figure 1
Model for Studying First-Year Teachers' Use of Problem-Solving Teaching


Methods Course
Student Teaching
First-Year Teaching
EXTENT OF USE OF PROBLEM SOLVING
(Microteaching)
-Video Tape Analysis
-Interview
PROBLEM SOLVING ABILITY
22 Undergraduates
7 Undergraduates
EXTENT OF USE OF PROBLEM SOLVING
-Student Teachers' Perceptions
-Coop Teachers' Perceptions
-Univ Supervisors' Perceptions
-Interview
22 Student Teachers
7 Student Teachers
EXTENT OF USE OF PROBLEM SOLVING
-Teachers' Perceptions
-Audio Tape Analysis
-Interviews
7 First-Year Teachers

PURPOSE AND OBJECTIVES

The research reported in this paper was designed to investigate the following questions:

1. To what extent do first-year teachers of vocational agriculture use the problem-solving approach to teaching?

2. What are the relationships between the extent to which first-year teachers use problem-solving teaching and (a) the extent to which they demonstrate problem-solving teaching behaviors in microteaching during the undergraduate course in methods of teaching, and (b) their general problem-solving ability.

The research reported in this paper pertains to the "Methods Course" and "First-Year Teaching" elements of the model described in Figure 1 (McKee, 1991).

PROCEDURES AND ANALYSIS

The initial sample was 22 undergraduates at The Ohio State University completing the course "Methods of Teaching Vocational Agriculture and Extension Education" during the spring and autumn quarters in 1987. The 22 students completed student teaching during the 1987-88 school year. Seven of these students who were first-year teachers of vocational agriculture during the 1988-89 school year constitute the sample for the research reported in this paper.

The dependent variable -- extent of use of problem-solving teaching -- was measured by two instruments. Audio recordings of classes taught by first-year teachers were analyzed by the investigator using an instrument developed by Boone (1988) that quantifies the extent to which problem-solving teaching behaviors are demonstrated. Scores on the Teaching Approach Instrument range from 1 to 7 with higher scores indicating that teachers demonstrate more extensive use of problem-solving teaching. Boone (1988) reported an internal consistency coefficient (Cronbach's alpha) of .96 for the Teaching Approach Instrument; content validity was established by a panel of experts.

First-year teachers' perceptions of the extent to which they use problem-solving teaching were quantified from responses to a 25-item instrument developed by Chuatong (1986). Responses to items describing behaviors associated with problem-solving teaching range from 1 (almost never or never) to 5 (almost always or always). Scores range from 25 to 125 with higher scores indicating that teachers perceive a more extensive use of problem-solving teaching.

First-year teachers made audio recordings and completed the Problem-Solving Instrument twice during the 1988-89 school year, when the investigator observed and interviewed each teacher. The scores on the two audio recordings were combined to form a composite rating of problem-solving teaching. Likewise, the responses to the two administrations of the Problem-Solving Instrument were combined to form one composite score for perceptions of problem-solving teaching.

The third microteaching exercise was recorded on video tape and analyzed using Boone's Teaching Approach Instrument to yield a rating of problem-solving teaching during the methods course. The general problem-solving ability of undergraduates was measured by the Cornell Critical Thinking Test, Level Z (Ennis, Millman, and Tomko, 1985). The investigator interviewed each undergraduate at the completion of the methods course.

The investigator analyzed the audio and video tapes. Four weeks after the initial analysis of tapes, random samples of both the audio and video tapes were reanalyzed. Correlations between the initial scores and the scores resulting from reanalysis were $r = .94$ for video tapes and $r = .90$ for audio tapes.

Scores on all instruments were treated as ordinal level of measurement. Relationships were described by Spearman rank-order coefficients.

RESULTS

Extent of Use: Problem-Solving Teaching

Composite ratings of the two audio tapes for the first-year teachers ranged from 3.05 to 5.40 on the 7-point scale. Five of the seven teachers' ratings of teaching performance were above the midpoint of the possible range of scores indicating that problem-solving teaching was being used (Figure 2). Scores on the Problem-Solving Instrument, reflecting the teachers' perceptions of the extent to which they used problem-solving teaching, ranged from 66.5 to 94.0 indicating that six of the seven teachers perceived their extent of use of problem-solving teaching was higher than the midpoint of the possible range of scores.

Figure 3 indicates that for five of the seven teachers, there is almost a direct correspondence ($n=5$; $r_s=.90$) between the rank orders on the perception scale and the rating of teaching from the analysis of the audio tapes. Two teachers do not fit the expected positive and linear relationship between perceptions and actual performance of problem-solving teaching.

Figure 2
First-Year Teachers' Perceptions and Ratings of Problem-Solving Teaching

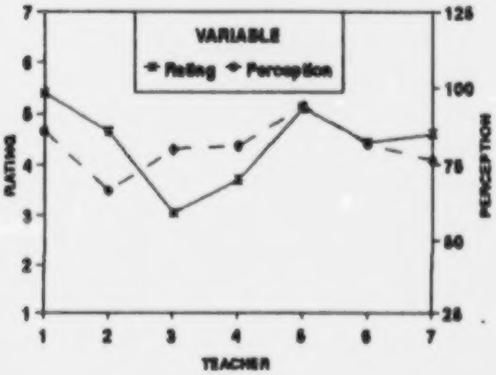
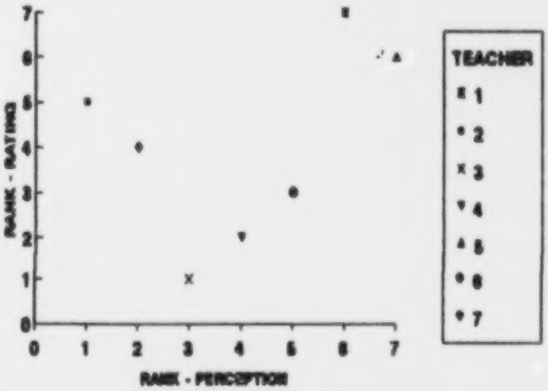


Figure 3
Relationship Between Perception and Rating of Problem-Solving Teaching



Rank 7 = Highest; Rank 1 = Lowest

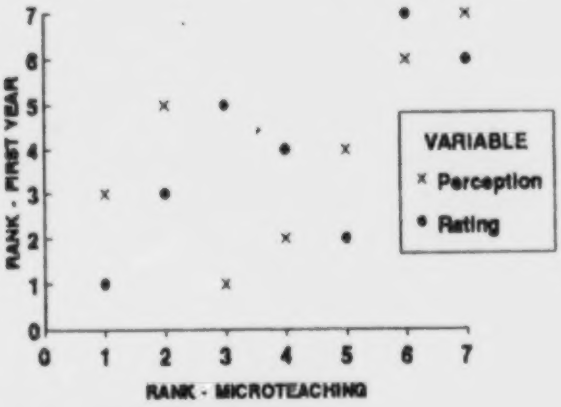
During the two interviews, "about 50% of the time" was the most frequent response when teachers were asked how extensively they used a problem-solving approach in classroom instruction. They indicated they used the lecture/subject matter approach when problem-solving techniques are not used. The teachers' assessments were that they were successful in using problem-solving strategies, even if problem-solving teaching was not used extensively.

First-year teachers presented a variety of responses when asked about difficulties that restrict the use of problem-solving teaching. Several teachers reported younger students, especially freshman, are more receptive to problem-solving techniques. Juniors and seniors do not respond as positively, especially if former teachers had not used problem-solving strategies. The extensive time required to plan and prepare for problem-solving teaching was mentioned frequently as a difficulty. They pointed out that students do not have real problems since students' supervised occupational experience projects are often weak. Most of the first-year teachers reported that the subject matter being taught is a factor in their decision to use the problem-solving approach. Teachers claimed that some subject matter is not amenable to problem-solving teaching. When students have little knowledge about or interest in a particular subject, difficulty is experienced in using problem-solving teaching. When teachers feel inadequate in their knowledge of the subject matter, difficulties in using problem-solving techniques were reported also. During the second interview all expressed more confidence in using problem-solving teaching than when they graduated from college.

Extent of Use and Methods Course Variables

The extent to which problem-solving teaching was demonstrated during microteaching was substantially and positively correlated with both first-year teachers' perceptions of the extent to which they use problem-solving teaching (r_s=.61) and the extent to which they actually used problem-solving teaching (r_s=.71). Figure 4 indicates that the "microteaching performance--perceptions of first-year teaching" relationship is clearly linear and positive for five of the seven teachers and that the "microteaching performance--ratings of first-year teaching" relationship is linear and positive for six of the seven teachers. Interpretation of the Spearman rank-order coefficients should be made with the realization that when n=7, coefficients of less than .71 have a probability of chance occurrence greater than one in ten.

Figure 4
Rating on Microteaching and First-Year Perception and Rating of Problem-Solving



Rank-order correlation coefficients:
For Perception = .61
For Rating = .71

Scatterplots of scores on the Cornell Critical Thinking Test and ratings of problem-solving teaching, both during microteaching and the first year of teaching, indicate no discernable relationships. Also, there was no relationship between scores on the Critical Thinking Test and the first-year teachers' perceptions of the extent to which they use problem-solving teaching.

CONCLUSIONS AND IMPLICATIONS

The investigation of problem-solving teaching by seven first-year teachers of vocational agriculture is summarized as follows:

1. First-year teachers who have completed a preservice teacher education program that emphasizes problem-solving teaching: (a) perceive their teaching as demonstrating behaviors that indicate problem-solving strategies and techniques are used, and (b) analysis of their classroom teaching confirms that problem-solving teaching is used considerably but not exclusively.

2. For five of the seven teachers, there is a direct correspondence between their perceptions about the extent to which they use problem-solving teaching and the extent to which their classroom instruction actually demonstrates problem-solving teaching. Teachers who perceive they use problem-solving teaching to a greater extent actually demonstrate a more extensive use of problem-solving strategies and techniques.

3. The first-year teachers do not use problem-solving teaching exclusively. Lecture/subject matter approaches to teaching are the alternatives mentioned most frequently. The difficulties teachers encounter in using problem-solving teaching are the extensive time required to plan for problem-solving teaching, students with inadequate supervised occupational experience programs, students with little interest in or knowledge of agriculture, lack of technical subject matter knowledge and skill on the part of the teacher, and the inappropriateness of problem-solving strategies for some subject matter areas.

4. The extent to which the first-year teachers had demonstrated problem-solving teaching when enrolled in an undergraduate methods course is positively and substantially related both to the teachers' perceptions and actual performance regarding the extent to which they use problem-solving teaching.

5. There is no evidence of relationships between general problem-solving ability as measured by the Cornell Critical Thinking Test and the extent to which undergraduates demonstrate problem-solving teaching during microteaching or first-year teachers' perceptions or performance regarding the extent they use problem-solving teaching.

Three implications of the research are proposed.

1. The direct connection between extent of use of problem-solving teaching during microteaching and the extent first-year teachers use problem-solving approaches highlights the importance of instruction and supervised practice regarding teaching strategies and techniques, whether problem-solving or otherwise, during the preservice teacher education program.

2. Undergraduate instruction and practice regarding teaching strategies and techniques should deal explicitly with the difficulties first-year teachers experience in using problem-solving teaching. For example, how valid and what are some possible remedies for the teachers' reported troublesomeness in using problem-solving teaching such as excessive time required to plan and the inappropriateness of problem-solving approaches when students and/or the teacher have limited knowledge of technical agriculture subject matter.

3. Clearly this research is exploratory. The findings provide the basis for more indepth study with larger samples to examine how first-year teachers teach, why they use the teaching strategies and techniques they do, how well they teach, and what factors in the undergraduate teacher preparation program explain how and how well first-year teachers teach.

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EXTENT OF USE OF THE PROBLEM-SOLVING APPROACH BY FIRST-YEAR TEACHERS OF AGRICULTURE

A Critique

Robert A. Martin, Iowa State University--Discussant

This paper focused on the use of problem-solving approaches to teaching by beginning teachers resulting in a very basic exploratory study using a very small sample. Nonetheless, the paper has merit in raising some critical issues regarding the use of problem-solving approach to teaching. I found the study to be interesting and certainly focused on a critical area of study. It was refreshing to find the authors referred to problem-solving as an approach to teaching rather than implying it is a single method or strategy.

The paper had a clear theoretical foundation established with support from a thorough literature review. The model given in the paper provided assistance in conceptualizing the study. The procedures appear to be appropriate for the study and they were well explained. However, I am always curious when researchers say that an instrument's content validity was established by a "panel of experts." Who made up the panel of experts? We see this phrase often, but rarely explained as to the types of people on the panel. I realize you used instruments developed by others, but we need more information about the instruments.

The paper would be enhanced had the authors briefly defined their interpretation of the problem-solving approach or the steps involved. The authors seem to assume that everyone reading the paper would know exactly what is believed to be the problem-solving approach to teaching. Is this a fair assumption? Additionally, the implications appear to be more like recommendations than implications. Perhaps this section is a mixture of both.

The issues raised by this study merit careful consideration and debate. The following questions are posed in an attempt to generate discussion in the profession:

> The authors indicate that the teachers thought they were successful in using problem-solving strategies even if problem-solving was not used extensively. What were the indicators of success? Are there some clear indicators or are these only perceptions?
>
> It seems preparation time was often mentioned as a liability in using problem-solving. Does the problem-solving approach to teaching really require that much more time to prepare and use? What about the pay-off? If it is effective, isn't it worth the time? What does this excuse say about teachers? What implications does this so-called time factor have for research and practice?
>
> Do we need to redefine "problem-solving" or at least rename it? The authors state that teachers refrain from using problem-solving because "many students don't have real problems to use in instruction." Do we have to have students experience problems to have real problems studied in the classroom? Maybe we need to analyze real situations in which students are either currently or will be involved. Case studies may be as real as any of those students may have or expect to have in their own experience programs.

The researchers have focused on a critical area in need of much more study. The teaching methods we use say a lot about us as teachers and more importantly they say a lot about the learning that does or does not occur in our classes.

THE RELATIONSHIP BETWEEN THE USE OF PROBLEM-SOLVING TEACHING DURING STUDENT TEACHING AND THE FIRST-YEAR OF TEACHING

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INTRODUCTION

Problem-solving has long been advocated as an instructional approach best suited for teaching vocational agriculture (Crunkilton and Krebs, 1982; Hammonds, 1950; Newcomb, McCracken, and Warmbrod, 1986). Rosenfeld (1984) proposed that problem-solving teaching, in combination with supervised occupational experience and FFA activities, distinguishes the effectiveness of vocational agriculture programs from other vocational education programs.

Proponents contend that problem-solving teaching makes operational the major principles of effective teaching and learning (Warmbrod, 1970); that problem-solving teaching develops students' abilities to think, to evaluate, to draw inferences, and make decisions (Phipps, 1952); and that problem-solving teaching contributes to the ability to transfer knowledge to real life situations beyond the school (Crunkilton, 1984).

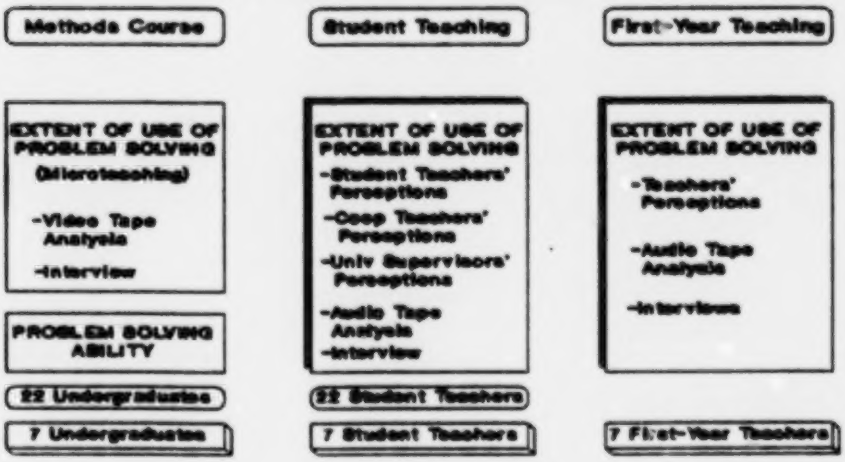
Moore and Moore (1984) debated the usefulness of problem-solving teaching arguing that its effectiveness is diminished since fewer students studying agriculture in secondary schools have either clearcut occupational goals in agriculture or appropriate supervised occupational experience projects -- both of which are basic to the effective use of problem-solving. Research concerning the effectiveness of problem-solving teaching is inconclusive and inconsistent; however, there is evidence that problem solving is effective when retention of knowledge is measured (Flowers and Osborne, 1986), that student teachers who use problem-solving teaching ask more higher order questions (Kirts and Stewart, 1983), and that students taught by teachers who use problem-solving teaching strategies exhibit higher levels of achievement and problem-solving ability (Chuatong, 1986).

Research reported in this paper involves a model that places the teaching behaviors of first-year teachers in the context of two major elements of the preservice teacher education program -- the undergraduate methods of teaching course and student teaching (Figure 1). The rationale of the model is that first-year teachers' knowledge, skill, and use of problem-solving teaching is an artifact of their knowledge, skill, and extent to which they demonstrate problem-solving teaching in microteaching exercises in an undergraduate methods course and during student teaching.

Although research concerning the value of microteaching in the preservice teacher education program is mixed, evidence indicates that microteaching does contribute to perspective teachers acquiring desirable teaching skills (Borg et al., 1969; Legge and Asper, 1972; Peterson, 1973; Yeany, 1978). Student teaching, particularly the cooperating teacher, has a major impact on the teaching skills acquired and demonstrated by student teachers and later by first-year teachers (Price, 1961; Seperson and Joyce, 1973; Steeves, 1952; Zimpher, et al., 1980).

Based on the work of Ronning, McCurdy, and Ballinger (1984), it was proposed that the general problem-solving ability of undergraduates preparing to be teachers may have some influence on the extent to which they demonstrate skill in using problem-solving teaching during microteaching, student teaching, and as first-year teachers.

Figure 1
Model for Studying First-Year Teachers' Use of Problem-Solving Teaching


Methods Course
Student Teaching
First-Year Teaching
EXTENT OF USE OF PROBLEM SOLVING
(Microteaching)
-Video Tape Analysis
-Interview
PROBLEM SOLVING ABILITY
22 Undergraduates
7 Undergraduates
EXTENT OF USE OF PROBLEM SOLVING
-Student Teachers' Perceptions
-Coop Teachers' Perceptions
-Univ Supervisors' Perceptions
-Audio Tape Analysis
-Interview
22 Student Teachers
7 Student Teachers
EXTENT OF USE OF PROBLEM SOLVING
-Teachers' Perceptions
-Audio Tape Analysis
-Interviews
7 First-Year Teachers

PURPOSE AND OBJECTIVES

The research reported in this paper was designed to:

1. Describe the extent to which student teachers enrolled in an undergraduate teacher education program and first-year teachers of vocational agriculture use problem-solving teaching, and

2. Investigate the relationship between the extent of use of problem-solving teaching during student teaching and the use of problem-solving teaching during the first year of teaching.

The research reported in this paper pertains to the "Student Teaching" and "First-Year Teaching" elements of the model described in Figure 1 (McKee, 1991).

PROCEDURES AND ANALYSIS

The initial sample was 22 undergraduates in agricultural education at The Ohio State University who completed student teaching during the 1987-88 school year. Seven of these student teachers who were first-year teachers of vocational agriculture during the 1988-89 school year constitute the sample for the research reported in this paper.

The variable "extent of use of problem-solving teaching" was measured by two instruments. Audio recordings of classes taught by student teachers and first-year teachers were analyzed by the investigator using Boone's (1988) Teaching Approach Instrument that quantifies the extent to which teachers demonstrate behaviors indicating problem-solving teaching. Scores on the Teaching Approach Instrument range from one to seven with higher scores indicating more extensive use of problem-solving teaching. Boone (1988) reported an internal consistency coefficient (Cronbach's alpha) of .96 for the instrument; content validity was established by a panel of experts.

Perceptions of the extent of use of problem-solving teaching were quantified from responses of student teachers, cooperating teachers, university supervisors, and first- year teachers to a 25-item instrument developed by Chuatong (1986) indicating the extent behaviors associated with problem-solving teaching are used. Scores on the Problem-Solving Instrument range from 25 to 125 with higher scores indicating that respondents perceive a more extensive use of problem-solving teaching.

Student teachers recorded two class sessions on audiotape. First-year teachers also recorded two class sessions. The investigator analyzed the audio tapes using the Teaching Approach Instrument. Four weeks after the initial analysis of tapes, random samples of the tapes were reanalyzed. Correlations between the initial scores and the reanalysis were r=.79 for the student teaching tapes and r=.90 for the first-year teachers' tapes. Scores on the two student teaching tapes were combined to calculate a composite rating of problem-solving teaching. Similarly, a composite score was calculated to obtain a rating of problem-solving teaching for each first-year teacher.

The investigator interviewed each student teacher following the student teaching experience and interviewed each first-year teacher twice during the school year.

Scores on both instruments were treated as ordinal level of measurement. Relationships were described by Spearman rank-order coefficients.

RESULTS

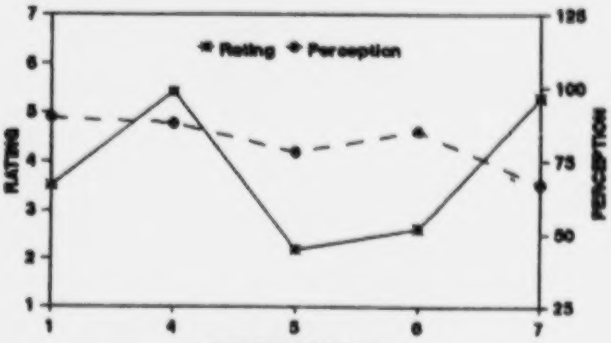
Use of Problem-Solving Teaching: First-Year Teachers

Composite ratings of the two audio recordings of classes taught by the seven first-year teachers ranged from 3.05 to 5.40 on the 7-point Teaching Approach Instrument. Ratings for five of the seven teachers were higher than the midpoint of the scale, indicating that the teachers were using problem-solving strategies and techniques. Scores on the Problem-Solving Instrument, reflecting the teachers' perceptions of the extent to which they used problem-solving teaching, ranged from 66.5 to 94.0 indicating that six of the seven teachers perceive their extent of use of problem-solving teaching to be higher than the midpoint of the possible range of scores. For five of the seven teachers, there was a positive linear relationship (r_s=.90) between the teachers' perceptions regarding their use of problem-solving teaching and their actual use of problem-solving strategies and techniques measured by analysis of audio tapes. Two teachers did not fit the linear pattern.

Use of Problem-Solving Teaching: Student Teachers

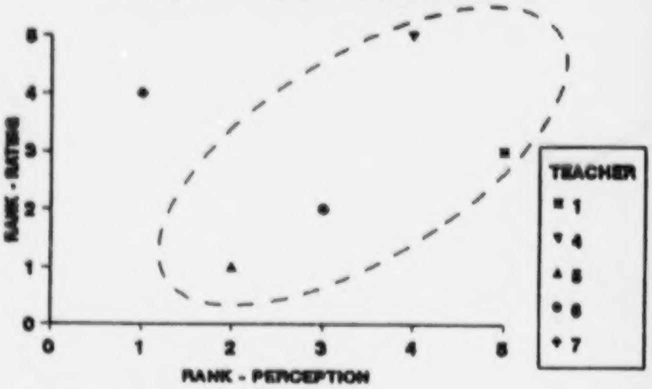
Only two of the five student teachers for whom audiotapes were available to rate their classroom teaching had scores on the Teaching Approach Instrument higher than the midpoint value of 4 indicating more than nominal use of problem-solving teaching. The scores ranged from 2.19 to 5.43 on the 7-point scale (Figure 2). On the scale measuring student teachers' perceptions of the extent to which they used problem-solving teaching, scores for the seven student teachers ranged from 67 to 90, with six of the seven scores above the midpoint of the 25 to 125 point scale. The scores indicate that student teachers perceive that they used problem-solving strategies and techniques. Figure 3 indicates a positive linear relationship (r_s=.80) between the perceptions about the extent of use of problem-solving teaching and actual use for four of the five student teachers for whom audio tapes were available for analysis. Teacher 7 is the only student teacher not fitting the linear pattern of a positive relationship between perceptions and actual ratings of problem-solving teaching.

Figure 2
Student Teachers' Perceptions and Ratings of Problem-Solving Teaching



Note: Audio tapes not available for Student Teacher 2 and Student Teacher 3.

Figure 3
Student Teaching: Perceptions and Ratings of Problem-Solving Teaching



Rank 5 = Highest; Rank 1 = Lowest

Cooperating teachers and university supervisors also completed a Problem-Solving Instrument for each student teacher to quantify their perceptions of the extent to which student teachers used problem-solving teaching. There was not agreement among student teachers, cooperating teachers, and university supervisors in their perceptions about the extent to which student teachers use problem-solving teaching.

During interviews student teachers were asked to assess their understanding of problem-solving teaching, to describe the extent they had used it, and to report difficulties experienced when using problem-solving strategies and techniques. Most of the student teachers maintained that they had used problem-solving "at least 50% or more of the time." They claimed that they understand the problem-solving approach, but readily admitted that the approach is difficult to use. Difficulties mentioned most frequently were starting the lesson, getting objectives, and setting up problems; extensive time required to plan; certain subjects not adaptable for problem-solving; high school students have few real problems since many have inadequate supervised occupational experience projects; lack of knowledge of agriculture by high school students; and the student teachers' lack of technical subject matter knowledge. The student teachers, one year later, repeated these same difficulties when asked to assess their use of problem-solving teaching during the first year of teaching.

The teacher education model emphasizes the role of the cooperating teacher as a "teacher of student teachers." Following that rationale, cooperating teachers completed the Problem-Solving Instrument indicating their perceptions regarding the extent they (cooperating teachers) used problem-solving teaching. Likewise, student teachers completed the instrument indicating their (student teachers) perceptions regarding the extent to which their cooperating teacher used problem-solving teaching. There was no agreement (r_s=.08) between cooperating teachers and student teachers in how the two groups ranked cooperating teachers on the extent they use problem-solving teaching.

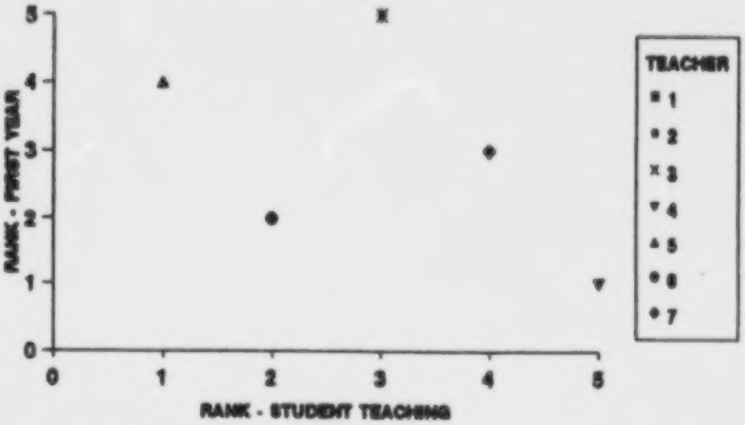
Interviews following student teaching revealed consensus among student teachers that cooperating teachers had helped little in teaching them to use problem-solving teaching strategies and techniques. Student teachers reported that cooperating teachers infrequently observe them teach, seldom give suggestions regarding teaching strategies and techniques, and provide few opportunities for them to observe problem-solving teaching.

Relationship: Student Teaching and First Year of Teaching

When ratings of teaching during student teaching are correlated with ratings of teaching during the first year of teaching, the rationale of the model for the research specifies an expectation that student teachers who use problem-solving teaching to a greater extent will demonstrate similar teaching behaviors as first-year teachers. The data reported in Figure 4 indicate no such systematic relationship.

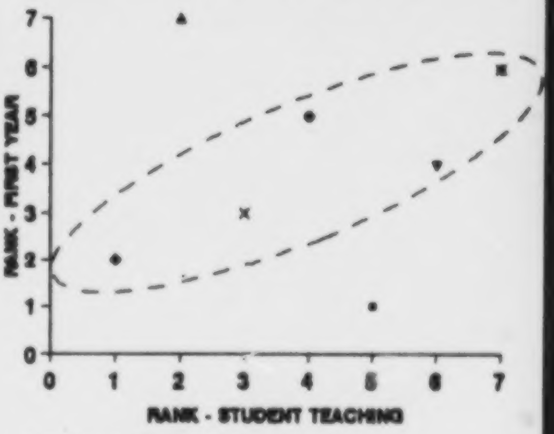
When student teachers' perceptions of their extent of use of problem solving teaching are correlated with their perceptions of the extent to which they use problem-solving teaching as first-year teachers, for five of the seven teachers the data support the expected positive linear relationship (r_s=.90). The data reported in Figure 5 indicate that two teachers do not fit the expected positive relationship between rankings of perceived use of problem solving teaching during student teaching and first-year teaching.

Figure 4
Rating of Problem-Solving Teaching:
Student Teaching and First-Year Teaching



Rank 5 = Highest; Rank 1 = Lowest

Figure 5
Perceptions of Problem-Solving Teaching:
Student Teaching and First-Year Teaching



Rank 7 = Highest; Rank 1 = Lowest

CONCLUSIONS AND IMPLICATIONS

The investigation of the relationship between the extent of use of problem-solving teaching by student teachers and first-year teachers is summarized as follows for the seven teachers involved in the study.

1. First-year teachers perceive they use problem-solving teaching; analysis of audio tapes of their teaching confirms that they use problem-solving strategies and techniques. For five of the seven teachers, the expected positive relationship between perceived use of problem-solving teaching and actual use of problem-solving strategies and techniques is supported.

2. Student teachers perceive that they use problem-solving teaching; analysis of audio tapes indicates only two of five student teachers received a rating of problem-solving teaching higher than the midpoint of the 7-point scale used to measure the extent of use of problem-solving teaching. For four of the five student teachers, the expected positive relationship between perceptions and use of problem-solving teaching is supported.

3. There is not agreement among student teachers, cooperating teachers, and university supervisors regarding their perceptions of the extent to which student teachers use problem-solving teaching. Likewise, there is not agreement between cooperating teachers and student teachers in their perceptions of the extent to which cooperating teachers use problem-solving teaching.

4. Student teachers report that problem-solving strategies and techniques are difficult to use. Difficulties voiced most frequently are extensive time required to plan, some subjects not amenable to problem-solving strategies, lack of real problems by students,

inadequate supervised occupational experience projects, and lack of knowledge of agriculture on the part of high school students and/or student teachers. One year later as first-year teachers they report the same difficulties in using problem-solving teaching.

5. Student teachers report that cooperating teachers provide little instruction or supervision in further developing their knowledge and skill in using problem-solving teaching strategies and techniques.

6. There is no relationship between student teachers' ratings of the extent they use problem-solving teaching and their ratings of the extent they use problem-solving teaching during the first year of teaching. There is partial support for the expected positive relationship between perceptions about the extent of use of problem-solving teaching during student teaching and during the first year of teaching.

Two implications of the research are proposed.

1. Since evidence is less than conclusive in support of the expected connection between knowledge and skill in using problem-solving teaching during student teaching and the first year of teaching, more careful attention needs to be given all phases of student teaching to strengthen its connections both to the undergraduate methods course and to the first year of teaching. Particularly crucial is the responsibility of the cooperating teacher to model problem-solving teaching and teach student teachers about and supervise their practice of problem-solving teaching strategies and techniques.

2. The research clearly indicates a lack of agreement among student teachers, cooperating teachers, and university supervisors about what constitutes problem-solving teaching. The hint is strong that there is misunderstanding and possible disagreement regarding what problem solving teaching is and how it is demonstrated. Analysis of the rationale, nature, and practice of problem solving teaching also requires a reassessment of instruments used to quantify both perceptions and actual use of problem-solving strategies and techniques.

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THE RELATIONSHIP BETWEEN THE USE OF PROBLEM-SOLVING TEACHING DURING STUDENT TEACHING AND THE FIRST YEAR OF TEACHING

A Critique

Robert A. Martin, Iowa State University--Discussant

This paper focused on the use of problem-solving approaches to teaching and the relationship between the use of problem-solving during student teaching and the first year of teaching agriculture. Obviously, this paper is a part of a larger study as introduced by the previous paper. The paper had a clear theoretical foundation and was well-supported by a review of the literature. I have the same basic concerns about this paper as I had for the previous one. I won't take the time to repeat them. However, I will say once again, it is very clear to me that some kind of definition or explanation of the problem-solving approach would make the paper much stronger. Given the findings in this study and reported in the paper, I believe I am more than justified in making that suggestion. Additionally, why were audiotapes not available for student teacher two and student teacher three?

It was interesting to note one of the most significant findings of this study. There was no agreement among student teachers, cooperating teachers and university supervisors in their perceptions about the extent of which student teachers use the problem-solving approach to teaching. Additionally, there was no agreement between cooperating teachers and student teachers as to the extent cooperating teachers use problem-solving or give guidance in its use. It was even more interesting to note that teachers perceive that they use a problem-solving approach but analysis of the audiotapes indicate they don't. The conclusion drawn from this information is that prospective teachers tend to do as teachers what they see other teachers (cooperating teachers) do. Rarely do they do as they are told.

The following questions are posed for discussion and debate in the profession:

Are the instruments/tools available to study teaching methodologies adequate or appropriate for us to measure impact of those methodologies? Is the profession serious about the use of a problem-solving approach to teaching and learning?

Does the profession really believe in the problem-solving approach to teaching? If so, why is there a hint of confusion about it in this basic study? Is the problem-solving approach pertinent to our needs? If so, when are we going to agree on what it is? How can we study it if it is unclear what we are studying?

This paper focuses on a critical area needing much more research and debate. Can it be that after decades of teaching agriculture the profession is as confused as ever on one of the basic foundations of agricultural education? The researchers need to continue their work in this area.

A THREE-YEAR NATIONAL STUDY OF TEACHER EDUCATOR, SUPERVISING TEACHER, AND STUDENT TEACHER PERCEPTIONS CONCERNING THE SELECTION OF STUDENT TEACHING CENTERS AND SUPERVISING (COOPERATING) TEACHERS IN AGRICULTURE

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INTRODUCTION

A successful student teaching experience is essential if a beginning teacher is to enter the profession with a positive attitude. Many student teachers have decided not to seek a career in teaching. Selecting sites for student teaching experiences is important, as this is often the determining factor as to whether an experience will be positive or negative. Kuehl (1984) stated that:

> Student teaching is a complex learning experience that requires careful supervision. Cooperating teachers must create a sustaining environment that will facilitate maximum development of student teachers. (p. 2)

How supervising (cooperating) teachers interact with student teachers, perform their daily duties while under the observation of student teachers, and display attitudes toward the occupation can be a strong influence on how the entire experience of student teaching is perceived.

Consider what might happen if the objectives of supervising teachers were vastly different from those of the university placing student teachers. Supervising teachers should serve as links between the university and student teachers during their training period. Yet, are supervising teachers being asked what they think should be the areas stressed when student teaching sites are selected, or has this all been left up to the discretion of university personnel?

Ekpunobi (1986) stated, "It could be that the official goals of practice teaching are different from what participants in the programme construe as the operative goals" (p. 5). If this is the case, it's time to identify what supervising teachers consider to be important in a student teaching program and the teaching centers involved in the training of future educators.

Spotanski and Frick (1989) stated that "The existing educational environment which you provide on a daily basis sends strong signals about your attitude toward them (students), teaching, and learning." (p. 7) Obviously, teacher educators want to place student teachers with supervising teachers who establish this type of learning environment. But, what is the best method for selecting such teachers? What characteristics should be emphasized? Norris, Larke, & Briers (1989) identified several characteristics of teacher education programs in agriculture that were important to teacher educators. But, from a supervising teacher's viewpoint, are there other duties more important than preparing classes for the student teachers arrival, helping them obtain housing, counseling on a daily basis, and orienting them to the school and administrative policies? (Priebe, D., Owen, S. D., & Luft, V. D. 1986; Abel, F. J., Ansel, D., Hauwiller, J. G., & Sparapani, E. F. 1986; Kuehl, R. 1984; Sparks III, W. G. 1987). Supervising teachers are more in touch with today's classroom problems, so it would be wise to find out from them what it takes to make a good training environment for a teacher of agricultural sciences. This study will give teacher educators, supervising teachers, and student teachers themselves an opportunity to provide input into the questions surrounding teacher education programs in agriculture.

PURPOSE AND OBJECTIVES

The purpose of this study was to determine the perceptions of teacher educators, supervising teachers, and student teachers concerning the selection of student teaching centers and supervising teachers in agricultural education programs nationwide. Specific objectives are as follows:

1. Determine the (ideal) characteristics, duties, and qualities of supervising teachers, student teaching centers and university teacher education programs.

2. Compare the responses of teacher educators, supervising teachers, and student teachers concerning the characteristics, duties, and qualities of supervising (cooperating) teachers, student teaching centers, and university teacer education programs.

3. Identify areas where teacher educators, supervising teachers, and student teachers differ in their perception of the factors which should be emphasized in a student teaching experience.

PROCEDURES

A survey containing questions related to four areas of a teacher education program in agriculture was mailed to each institution with a teacher education curriculum. One population consisted of head teacher educators in the United States. An identical survey was mailed to supervising teachers nationwide. There were 753 supervising teachers in the population. A stratified random sample (Krejcie & Morgan 1970) was used, with state representation equal to the percentage of their teachers nationally. A total of 255 teachers were randomly selected. Lists of teachers were supplied by departments of agricultural education. After two mailings and a telephone follow-up of non-respondents, the response rate for the two surveys were 91 % (84 of 92) for the teacher educators and 77 % (196 of 255) for the supervising teachers. The same survey instrument was then mailed to all student teachers, nationwide, identified as student teaching during the 1991-92 school year. Following two mailings and a follow-up phone call, a 71 % return rate (290 of 406) was achieved.

The instrument was developed by the researchers and a panel of experts in the field (Norris, Larke, & Briers 1989) based on the review of literature; it measured teacher educators' and supervising teachers' perceptions concerning characteristics of supervising teachers, student teaching centers, duties of supervising teachers, and responsibilities of institutions placing student teachers. A five point Likert-type scale (Likert, R. 1932) was used to determine level of agreement with characteristics of supervising teachers, their duties as supervising teachers, the student teaching center itself, and responsibilities of universities ("5" = strongly agree, "4" = agree, "3" neither agree nor disagree, "2" = disagree, and "1" = strongly disagree). Also, several fill-in-the-blank questions were used to determine perceived minimum requirements for various portions of a student teaching program.

RESULTS

Results are presented in four areas: (1) characteristics of supervising teachers, (2) duties of supervising teachers, (3) qualities of student teaching centers, and (4) responsibilities of the university for student teaching.

Characteristics of Supervising Teachers

Table 1 summarizes teacher educator, supervising teacher, and student teacher responses concerning the characteristics which supervising teachers should possess.

Table 1

Comparison of Supervising (Cooperating) Teacher's, Teacher Educators', and Student Teacher's Perceptions Concerning The "Ideal" Personal Characteristics for Supervising Teachers in Agriculture

Characteristic Supervising teachers should:	Supervising Teacher Perceptions		Teacher Educator Perceptions		Student Teacher Perceptions	
	n	Mean^{a}	n	Mean^{a}	n	Mean^{a}
practice good student management skills in both the classroom and lab	189	4.61^{1}	78	4.78^{1}	290	4.49^{1}
display continual professional growth	190	4.54^{2}	78	4.62^{2}	288	4.25^{3}
practice good housekeeping in classroom and lab	190	4.40^{3}	78	4.49^{3}	290	4.30^{2}
dress in an exemplary manner as a role model	190	4.14^{4}	78	4.31^{4}	289	3.81^{6}
be compensated (monetarily)	190	4.06^{5}	71	4.16^{7}	290	3.37^{8}
have teaching style observed by university	188	4.00^{6}	78	4.21^{6}	290	4.00^{4}
have state staff approval	189	3.93^{7}	72	4.31^{4}	289	3.98^{5}
be identified as an opinion leader	190	3.70^{8}	77	3.87^{9}	287	3.51^{7}
have Master's degree	189	3.08^{9}	78	4.14^{8}	289	2.94^{9}
be a graduate of the institution placing student teacher	190	2.79^{10}	78	2.85^{10}	289	2.79^{10}
have ____ years of teaching experience in the school system	190	4.05	78	3.62	280	4.06
have a minimum of ____ years total teaching experience	190	4.52	78	4.86	282	5.50
be on a ____ month contract	173	11.27	76	11.59	268	11.26
conduct at least ____ SAEP visits per year	180	3.44	76	3.07	267	3.58

The three survey groups stated that the ideal supervising teacher should (a) practice good student management skills in both the classroom and lab, (b) display continual professional growth, (c) practice good housekeeping in the classroom and lab, (d) dress in an exemplary manner as a role model, (e) be compensated (monetarily), (f) have their teaching style observed by a university official, and (g) have the approval of the state staff. They also felt that supervising teachers should be on 11 month contracts, have four years of teaching experience in the present school system, four and one-half years total teaching experience, and conduct at least three SAEP visits per student per year.

Duties of Supervising Teachers

Table 2 summarizes the responses of teacher educator, supervising teacher, and student teachers concerning the duties that they felt were most important to be effective trainers of student teachers.

Table 2

Comparison of Supervising (Cooperating) Teacher's, Teacher Educators', and Student Teacher's Perceptions Concerning The "Ideal" Duties of Supervising Teachers in Agriculture

Duties Supervising teachers should:	Supervising Teacher Perceptions		Teacher Educators Perceptions		Student Teacher Perceptions	
	n	Mean^{a}	n	Mean^{a}	n	Mean^{a}
meet with student teacher before first day of class	190	4.72^{1}	78	4.80^{1}	290	4.63^{1}
observe student teachers teach once per day	189	4.34^{2}	78	4.55^{2}	289	3.93^{3}
set aside a formal time to critique and counsel student teacher each day	190	4.27^{3}	76	4.41^{5}	286	3.99^{2}
approve all lesson plans prior to use	189	4.14^{4}	78	4.45^{4}	288	3.63^{6}
be required to attend a special course or workshop	190	4.11^{5}	78	4.51^{3}	290	3.84^{4}
aid in helping student teacher find housing	190	3.93^{6}	78	3.98^{6}	290	3.76^{5}
handle major discipline problems	188	3.73^{7}	78	3.95^{7}	290	3.63^{6}
require the student teacher to observe ____ days prior to teaching	177	5.31 days	76	4.86 days	250	5.28 days
require the student to teach at least____ adult/ young farmer class(es)	153	1.31 classes	73	1.12 classes	270	1.47 classes
be responsible for determining ____ % of the student teacher's grade	175	61.57%	76	54.24%	278	59.47%

[a] Mean scores for supervising teachers, teacher educators, and student teachers are followed by the ranking of importance given the question by each group.

The single most important duty of a supervising teacher as identified by the respondents was that they meet with the student teacher prior to the first day that they are to begin their student teaching experience. They also stated that it was important to observe student teachers teach each day, set aside a formal time to critique and counsel student teachers each day, approve all lesson plans before the student teacher uses them, and that they should be required to attend a special course or workshop concerning supervision of student teachers.

Qualities of Student Teaching Centers

Responses of teacher educators, supervising teachers, and student teachers concerning the qualities which should be observed in student teaching centers are summarized in Table 3.

Table 3

Comparison of Supervising (Cooperating) Teacher's, Teacher Educators', and Student Teacher's Perceptions Concerning "Ideal" Student Teaching Centers

Characteristic						
	Supervising Teacher Perceptions		Teacher Educators Perceptions		Student Teacher Perceptions	
Student Teaching Centers should:	N	Mean [a]	N	Mean [a]	N	Mean [a]
have an active FFA chapter	186	4.69^{1}	75	4.84^{1}	289	4.53^{1}
have cooperation from the local administration	186	4.61^{2}	75	4.82^{2}	289	4.52^{2}
have a clean safety record	186	4.22^{3}	75	4.47^{3}	289	4.13^{4}
contain an updated library	185	4.22^{4}	75	4.43^{4}	289	4.00^{5}
have up-to-date equipment and furnishings	186	4.12^{5}	75	4.33^{6}	289	3.84^{6}
require students to have an approved SAEP	186	4.00^{6}	74	4.43^{4}	288	3.81^{7}
have a record of outstanding accomplishments	186	3.93^{7}	75	4.32^{7}	289	3.75^{9}
be located in a comprehensive high school	185	3.88^{8}	72	3.92^{11}	286	3.77^{8}
be used as a center only once per year	186	3.87^{9}	74	3.97^{10}	287	3.35^{13}
be selected based on the scope and quantity of courses offered	186	3.87^{10}	75	3.99^{9}	289	3.52^{11}
be consistently ranked above other departments	184	3.81^{11}	75	4.28^{8}	288	3.65^{10}
reimburse student teachers for formal expenses	185	3.74^{12}	74	3.82^{12}	289	4.21^{3}
have an active adult/ young farmer program	185	3.13^{13}	75	3.79^{13}	289	3.38^{12}
be multi-teacher departments	186	2.35^{14}	74	2.58^{14}	289	2.98^{14}
be assigned no more than ____ student teacher(s) per supervising teacher	184	1.27 teachers	71	1.58 teachers	273	1.40 teachers

[a] Mean scores for supervising teachers, teacher educators, and student teachers are followed by the ranking of importance given the question by each group.

Teacher educators, supervising teachers, and student teachers agreed that the following characteristics of student teaching centers were the most important to consider in the selection of that site: (a) they should have an active FFA chapter, (b) there should be cooperation from the local administration, (c) centers should have a clean safety record, (d) there should be an updated library present in the center, (e) the classroom and farm shop laboratory should have up-to-date equipment and furnishings, (f) students in the program should be required to have an approved SAEP, (g) they should reimburse student teachers for all formal expenses such as mileage, meals on trips, etc. This question presented the largest difference of opinion among the groups. Teacher educators and supervising teachers ranked this twelfth among the fourteen questions in this section, while student teachers placed it third on the list of importance.

Responsibilities of University Student Teaching Programs

Table 4 portrays the responses of teacher educators, supervising teachers, and student teachers concerning the responsibilities of university teacher education programs.

Table 4

Comparison of Supervising (Cooperating) Teacher's, Teacher Educators', and Student Teacher's Perceptions Concerning "Ideal" University Student Teaching Programs

Characteristic University Ag. Ed. Programs should:	Supervising Teacher Perceptions^{a}		Teacher Educators Perceptions^{a}		Student Teacher Perceptions^{a}	
	n	Mean	n	Mean	n	Mean
provide information on possible student teaching centers	190	4.22^{1}	78	4.29^{4}	288	4.23^{1}
require a field experience prior to student teaching	189	4.11^{2}	78	4.56^{2}	288	4.05^{3}
"match" student teachers and supervising teachers based on personalities, etc.	190	3.90^{3}	78	4.39^{3}	290	4.00^{4}
allow faculty members to make final student teacher placement decisions	188	3.77^{4}	78	4.63^{1}	288	3.08^{5}
allow each student teacher to select teaching center	190	3.64^{5}	78	3.17^{6}	290	4.13^{2}
require the student teacher to live in the community	189	3.51^{6}	78	3.76^{5}	289	2.83^{6}
require the student teaching experience to last at least ____ weeks	189	10.86 weeks	80	10.62 weeks	282	9.94 weeks
establish a maximum teaching load of ____ classes	180	4.29 classes	76	4.58 classes	282	4.12 classes
compensate student teachers in the amount of ____ dollars	118	$257.07	76	$9.63	171	$899.74

This area of the survey provided the greatest difference of opinion among the three groups. Supervising teachers and student teachers believed that the number one duty of a university teacher education program was to provide information on possible teaching centers to prospective student teachers. Teacher educators felt the most important duty was to allow faculty members to make the final decision as to placement of the student teacher (this ranked 4th and 5th on the list for the supervising teacher and student teacher groups respectively).

CONCLUSIONS AND RECOMMENDATIONS

The results of these studies should be welcome news. Teacher educators, supervising teachers, and student teachers nationwide agree generally concerning qualities desired in supervising teachers and in student teaching centers, duties of supervising teachers, and of the university responsibilities.

It is recommended that individual departments use this study as a guide to determine how their own personnel, supervising teachers, and student teachers perceive their program. If major differences exist between teacher educators, supervising teachers, and student teachers in individual teacher education programs, these need to be addressed.

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A THREE-YEAR NATIONAL STUDY OF TEACHER EDUCATOR, SUPERVISING TEACHER, AND STUDENT TEACHER PERCEPTIONS CONCERNING THE SELECTION OF STUDENT TEACHING CENTERS AND SUPERVISING (COOPERATING) TEACHERS IN AGRICULTURE

A Critique

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The focus of this study was the process and management of the student teaching experience especially as it relates to the selection of teaching centers and cooperating teachers. This study is important because it has been shown over and over that the student teaching experience is a significant internship having profound impact on the student teacher. The cooperating teacher is a significant factor in this experience. The theoretical frame of the study was well-grounded in learning theory and supervisory practice. The authors used an interesting mix of literature review and questioning. The questions helped focus the reader on the real issues.

The procedures for this study were clear and appeared to be appropriate for the purpose of this research effort. However, I am curious why it is assumed that "head" teacher educators are the best sources for information on the supervision/student teacher placement situation? Many of these "heads" are not directly involved in student teacher placement and may not be an accurate source of information on the subject. Can you assume they passed the questionnaire on to the person who does the work? This situation raises a concern about the procedures and results. Additionally, who made up "the panel of experts?" We see this phrase often, but rarely is it explained as to the types of people on the panel. Spelling and grammar errors made the paper less than complete. How do objectives 2 and 3 differ? How was the instrument's reliability assessed? The title was very lengthy and included the words "three-year study," but no reference was made to this three-year feature in the paper. The conclusions and recommendations of the study seem rather abbreviated and obvious although the one recommendation does provide a practical suggestion.

The issues raised by this study merit careful consideration and debate. The following questions are posed in an attempt to generate discussion in the profession:

> Why is it that the "mechanics" of placement would be such a critical concern with teacher educators when it could be argued that "training for supervision" is more of a critical placement issue than merely concentrating on the placement effort to get the so-called "perfect match," whatever that may be? Why is it that "training to be a supervisor" was not listed as a responsibility of teacher education? This factor is surely as much a placement issue as any others could be?
>
> Do supervising teachers understand and therefore practice a clear set of supervisory principles and best practices? What common set of principles are being followed by supervising teachers? How can supervision at this level be improved to enhance professional growth of all parties? What is the relationship between supervisory practice and suitability of the student teaching center?

The researchers have introduced an important area of concern. There may be more substance here than what immediately is reported. We need to continue to assess the student teaching experience and acknowledge the fact that the experience starts with placement.

A NATIONWIDE EXAMINATION OF MIDDLE SCHOOL ENROLLMENT IN AGRICULTURAL EDUCATION AND MEMBERSHIP IN THE NATIONAL FFA ORGANIZATION

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INTRODUCTION

Nationally, enrollment in secondary agricultural education programs and membership in the FFA is declining. The total national FFA membership for 1989 was 397,115 students, but the figures had dropped to 383,450 by 1991. In 1991, there were 533,959 students enrolled in secondary agricultural education programs, with only 71.8% of the students enrolled as members of the FFA. The FFA organization had its largest membership in 1977 with 509,735 members. Membership declined 24.8% between 1977 and 1991. At the 1988 National FFA convention a constitutional amendment was passed that officially allowed middle school aged youth membership into the organization. This amendment was seen as a way to increase membership in the organization.

It could be argued that if middle schools offered exploratory agricultural education programs, those students who enrolled would remain in the secondary school programs. Likewise, it could be assumed that if enrollment in agricultural education increased, membership in the National FFA Organization [FFA] servicing those students would also experience an increase in membership.

Support for agricultural education at the middle-school level is based on both policy and research studies. The SCANS report for America 2000 (1992) supported the notion that teaching should be offered "in context" so students can learn to solve realistic problems. Another suggestion was to improve the match between what work requires and what students are taught. In the recommendations for the "Learning a Living" system, the commission recommended that, "Every student should complete middle school (about age 14) with an introduction to workplace know-how."

The National Research Council's report (1988) made a strong case for instruction "about agriculture" beginning in kindergarten or first grade. This was an effort to improve the agricultural literacy level of Americans.

Hall (1991) surveyed agricultural education leaders in each state to determine the extent of organized programs being taught "about agriculture" to grades kindergarten through 8th grade. Thirty-two states reported that programs were being conducted in at least one grade level. Twenty-three states offered FFA participation for their 7th and/or 8th grade students. (Hall, 1991)

Information from two sources was used to develop a framework for examining reasons students enroll in these programs. First, Jackson and Bosma (1990) indicated that middle schools include some three to five years between the elementary and high school focused on the educational needs of students in the in-between years. Second, Lam (1982) classified the barriers to enrollment into three main categories: (1) intrapersonal reasons such as attitudes, perceptions, images, motivation, career maturity and value systems; (2)

the influence of others such as parents, friends, counselors, neighbors, teachers and other relatives; (3) remote external reasons such as socioeconomic status, parental income and parental educational levels.

PURPOSE AND OBJECTIVES

This study was funded by the National FFA Organization. Its major purpose was to determine the current status of middle and junior high school agricultural education and FFA programs and make recommendations for possible future development. Middle and junior high school students were defined as those enrolled in grades 6, 7, and 8. Specifically, the objectives were as follows:

1. To establish national baseline information regarding middle and junior high school enrollment in agricultural education and membership in the National FFA Organization.
2. To identify features and critical components of selected successful middle and junior high school agricultural education programs.
3. To identify factors influencing students' decisions to enroll in middle and junior high school agricultural education programs and become members in the National FFA Organization.
4. To determine why middle and junior high school students do not plan to enroll in agricultural education classes or become members of the FFA in high school.
5. To identify the perceived benefits and disadvantages of middle and junior high school agricultural education programs.

PROCEDURES

This descriptive study was completed in the Spring of 1991. Questionnaires were sent to all state FFA executive secretaries (N=53). Additionally nine states were identified as having middle or junior high agricultural education school programs (i.e., Alabama, Florida, Georgia, Louisiana, Mississippi, New York, Oklahoma, Virginia and Wisconsin). Each state FFA executive secretary in the states identified above was asked to identify three successful middle or junior high school agricultural education programs. These teachers were also sent questionnaires (n=27) and they were asked to collect information from one of their classes by questionnaire.

A total of 52 of the 53 (98%) state FFA executive secretaries returned their questionnaires. The number of teacher questionnaires that were returned was 23 (85%). The teachers collected information from 598 students in their middle or junior high school agriculture classes.

The content validity of the questionnaires was established by use of a panel composed of six agricultural education professors and one graduate student. A field test was conducted at two schools that were not a part of the sample. The reliability of the students' questionnaires was determined during the field test using the test-retest procedures over a two week interval. The reliability coefficients of stability ranged from .78 to .89 at the two schools.

RESULTS

This summary is organized around the objectives of the study. The specific data and information follow the statement of the objective.

Objective 1: To establish national baseline information regarding middle and junior high school enrollment in agricultural education and membership in the National FFA Organization.

The state FFA executive secretaries reported that 52,968 individuals were enrolled in middle or junior high school agricultural education programs. Of this total, 17,722 (33%) were members of the FFA.

Table 1 shows student enrollment by grade level. There were 1,547 schools offering agricultural education programs, and 1,246 schools offering membership in the FFA. According to the state FFA executive secretaries, the average middle or junior high school agricultural education program was 17 weeks in length, and ranged from 6 to 36 weeks.

Table 1

Enrollment in Programs

Grade Level	Schools w/ Ag. Ed.	Students w/ Ag. Ed.	Ave. Program Length	Schools w/ FFA	Students w/ FFA
6th	21	924	9 wks.	15	124
7th	514	22,056	20 wks.	378	4,730
8th	1,012	29,988	21 wks.	853	12,868
Total	1,547	52,968	17 wks.	1,246	17,722

The earliest middle or junior high school agricultural education program was reported being conducted for eighth graders in 1926 in Virginia. Vermont reported starting seventh grade programs in 1930. Sixth grade programs were first started in Mississippi in 1974. Nationally, 30 states reported having a middle or junior high school agricultural education program.

Membership in the FFA was first accepted in Virginia in 1926 for eighth graders. Louisiana first accepted membership from seventh graders in 1960. In 1974, Mississippi first accepted membership from sixth graders. Nineteen states reported some type of FFA activities for middle or junior high school students.

For the 598 students responding to the questionnaire, 33% were female while 67% were male. Eighty-three percent of the sample was white, 13% black, 2% Native American, 1% Hispanic and 1% Asian. Seventy-seven percent indicated that they lived in the country or in a small town, but not on a farm; 17% lived on a farm; and 6% lived in a large city.

Seventeen states reported providing some type of state level competition for middle or junior high school FFA members. Fourteen states reported holding this competition in conjunction with secondary school FFA events. The more popular state competitions reported included: creed speaking, livestock judging, public speaking, crops, and showing livestock. Fourteen state FFA executive secretaries indicated that there should not be national competitions for middle or junior high school students.

Eighty-seven percent (20) of the teachers reported local competitions for middle or junior high school FFA members. Fourteen teachers reported that the competition was held in conjunction with high school FFA events. Popular local competitions held included: public speaking, livestock judging, soils, and creed speaking.

Twelve of the state FFA executive secretaries indicated that their middle or junior high school FFA chapter was organized separately from the secondary school. Twenty-four states reported their chapters were a joint chapter with the high school FFA. One state reported having junior chapters working with high school chapters and one state reported having mini chapters.

The middle or junior high school teachers in 14 of the schools reported that they had FFA chapters that were organized separately from the high school. Seven teachers said their chapter was a joint chapter with the high school FFA. Two teachers indicated that they did not have a middle or junior high school FFA chapter. Two schools had separate chapters for each middle or junior high school grade.

According to the state FFA executive secretaries, FFA dues were required in 27 states. Dues ranged from $.50 to $8.00 per member. The average charged was $4.00. Thirty-one states reported that programs were funded with local funds, 14 with state funds, and 7 with federal funds.

Eighteen of the twenty-three teachers indicated that students were charged dues to be a member of the FFA. According to the teachers, the average FFA dues charged per student was $2.56, with a range of $0.50 to $7.00

Objective 2: To identify features and critical components of selected successful middle and junior high school agricultural education programs.

Fourteen state FFA executive secretaries reported that their state had a core curriculum for their middle and junior high school agricultural education program. The topics reported by the state FFA executive secretaries to be in the core curriculum included 23 different items. Only six of these topics were reported in common by at least one-half of the 14 state FFA executive secretaries. The topics included: plant science, career exploration, agricultural literacy, animal science, conservation, and mathematics.

Twenty-one of the middle or junior high school teachers indicated they had a core curriculum for their agricultural education programs. The most common topics included: animal science, history of FFA, leadership, plant science, parliamentary procedures, role of FFA, and career exploration.

The middle or junior high school teachers responded that 16 of the programs in the 6th, 7th, and 8th grade were required courses while 25 were elective courses. Twenty teachers reported they did have local competition for middle or junior high school FFA members. Two teachers did not have local competition. For those teachers that did have local competition, the majority (14 teachers) indicated that competition was held in conjunction with high school FFA events. In addition, competitions were between schools at a county, area or district level. The most popular local competitions in rank order included: public speaking, livestock judging, soils, creed speaking, parliamentary procedures and dairy judging.

The teachers indicated that there were several components to a successful middle or junior high school agricultural education program including: parents who are supportive; teachers who are patient, enthusiastic, flexible, innovative, concerned with and enjoy students, and love the FFA; and students with good attitudes and eagerness.

According to the teachers, components of a successful FFA chapter for middle or junior high school students included: a teacher that is enthusiastic, creative, involved, aware and a strong promoter of the FFA; and support from groups such as school administrators, parents, high school FFA chapter, FFA alumni, advisory council and community members.

Objective 3: To identify factors influencing students' decisions to enroll in middle and junior high school agricultural education programs and become members in the National FFA Organization.

The state FFA executive secretaries indicated that the major factor encouraging middle or junior high school students to enroll was their agricultural education instructor. Other factors included the FFA activities; the program; other people such as school administrators, counselors, parents, brothers and sisters, FFA advisors, current and former students and selected teachers. Teachers reported that the FFA activities were the major encourager of enrollment, followed by "hands-on" activities.

The students clearly identified their local agriculture teacher as the person who most encouraged them to enroll in middle or junior high school agricultural education programs. Students' fathers, mothers, and friends also tended to encourage students to enroll in these programs. Students reported that they seldom talked with their brothers, sisters, or other relatives or other teachers regarding their decision to enroll in agricultural education.

Students reported that the major reason they enrolled in the program was because it was a fun class. They also indicated that they wanted to learn about agriculture, liked to learn about animals, and liked to work with their hands.

Students also indicated what they liked best about the agriculture class. The most popular response was that students liked to work with their hands. Other reasons included: the class was fun, they liked planting plants, and they liked learning about animals and different things.

The characteristics that the students liked best about their teacher included: the teacher was nice, was funny and helped students. When asked what they least liked about their agriculture class, the most popular response was "nothing". Some students, however, did write in different responses including: the classroom work, kind of work, boring class and taking notes. Seventy-one percent of the students indicated they were members of the FFA, while 29% indicated they were not members. These FFA members most liked the trips, meeting people, and having fun. When asked what they least liked about the FFA, the most popular response written in by over half of the students was, "nothing". The other minor items included: the work involved, a lack of activities and learning about the creed and parliamentary procedures.

The major barrier to having students enroll in middle or junior high school agricultural education programs, according to the state FFA executive secretaries, was school policies such as funding and a shortage of staff. They also reported scheduling problems and the perception that agriculture lacked opportunities. Teachers reported similar views.

Objective 4: To determine why students do not plan to enroll in agricultural education classes or become members of the FFA in high school.

The students were also asked to indicate if they would enroll in agricultural education in secondary school. A total of 53% of the students reported they planned to enroll in agriculture classes in high school, 30% were undecided, and 17% said they would not enroll. The most often cited reasons for not enrolling in agriculture classes in high school included: not being interested in agriculture and wanting to take other courses.

When asked about becoming a member of the FFA in high school, 84% indicated they did plan to join, 13% were undecided and 3% said no. The reasons most often cited for not becoming a FFA member in high school included the lack of interest in the FFA and wanting to become involved in other activities.

Objective 5: To identify the perceived benefits and disadvantages of agricultural education programs.

The state FFA executive secretaries indicated that increased agricultural literacy was the major student benefit of middle or junior high school agricultural education programs. They also indicated that it would help to increase the enrollment in secondary agricultural education programs. Other benefits identified included: participation in the FFA, career awareness, leadership development, reduced drop-out rates, and increased self esteem.

Teachers indicated the following additional benefits: occupational exploration; increased responsibility, respect, human relations skills, speaking ability, and student recognition; and increased enrollments of nontraditional students (e.g., females, minorities, gifted).

Fewer disadvantages were reported, by the state FFA executive secretaries, for students who enroll in middle or junior high school agricultural education programs. The state FFA executive secretaries indicated that there was a possibility for burn out of students, the lack of preparation that agriculture teachers have to work with middle or junior high school students, and the potential for duplicating course work with secondary school courses.

Similar disadvantages were cited by the teachers. Additional disadvantages given include: lack of facilities and funding, large class size and inadequate curriculum.

RECOMMENDATIONS

The following recommendations are offered for the national, state, and local level for establishing these programs.

National Level

1. Since the FFA is an intracurricular activity, The National FFA Organization, the U.S. Department of Education, and the U.S. Department of Agriculture should encourage development of a middle and/or junior high school agricultural education core curricula including its mission, content, goals and

objectives, experiential learning strategies, articulation with other agricultural education programs and funding options prior to expanding FFA programs to that level.

2. Promotional efforts to increase middle and junior high school membership in the FFA should give greater attention to attracting minorities and females. It should also recruit students from urban and suburban areas.

State Level

1. State education agencies and teacher education programs should design programs that would prepare current and prospective teachers to work with middle and junior high school students.
2. State education agencies should establish criteria for teacher certificates and funding options for agricultural education programs at the middle and junior high school level.

Local Level

1. Agricultural educators should not encourage combined FFA organizations for middle and junior high school students with high school students.
2. Agricultural education teachers should develop promotional materials that clearly indicate the benefits of participating in middle and junior high school agriculture and FFA programs. Example benefits include: increased agricultural literacy, career awareness, self-esteem and leadership development; and potential for reducing drop-out rates.

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A NATIONWIDE EXAMINATION OF MIDDLE SCHOOL ENROLLMENT IN AGRICULTURAL EDUCATION AND MEMBERSHIP IN THE NATIONAL FFA ORGANIZATION

A Critique

Joe W. Kotrlik, Louisiana State University--Discussant

I would like to commend the author for selecting a very timely and important topic such as middle school agricultural education programs and membership in the National FFA organization. As the literature review shows, little has been done in this area. Middle school agricultural education programs are very important to the future of our total agricultural education program in the United States.

The purpose and objectives were clearly written and the design of the study, instrumentation and data analysis procedures are appropriate for this study. The use of test-retest reliability measures for the student questionnaires was a strength of this study.

I found that the review of literature was limited in depth and scope. Although the research literature is limited in this area, more has been written about middle school agricultural education programs than the review of literature would lead one to believe.

I found it interesting that a study by Hall (1991) was cited in the review of literature that found that "Twenty-three states offered FFA participation for their 7th and/or 8th grade students." Also, in the findings section for objective two, 14 states reported they had a core curriculum for their middle and junior high school agricultural education program. Barrick and Hughes report in another manuscript presented at this year's NAERM that 31 state supervisors reported students were enrolled in middle school agricultural education programs in their states. However, in the procedures, it was reported that ". . . nine states were identified as having middle or junior high agricultural education school programs." It seems that either all states with middle school agricultural education programs should have been used in this study, or an explanation should have been provided as to why and how the nine states were selected.

It is interesting to note and question why no conclusions based on the objectives were drawn. I was disappointed that conclusions or recommendations were developed to address the perceived disadvantages of enrolling in middle school agricultural education programs, such as the potential for duplication of coursework. I question the recommendation that "Agricultural educators should not encourage combined FFA organizations for middle and junior high school students with high school students." This was not addressed in this study and I did not find any other basis for the authors to make this recommendation.

I compliment the researchers for conducting this study and want to encourage them to conduct additional research relative to the role and merits of middle school agricultural education programs.

STATE POLICIES AND STATE AGRICULTURAL EDUCATION SUPERVISOR PERCEPTIONS RELEVANT TO MIDDLE-GRADE AGRICULTURAL EDUCATION

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INTRODUCTION

Early adolescence is the period from about age 10 to 14 and is characterized by many physical, psychological, social, and intellectual changes associated with the onset of puberty. Because of these changes, the early adolescent has unique educational needs for which middle-grade (grades six through eight) schools were established.

Many middle-grade schools offer agricultural education and other career-oriented programs to students; however, career-oriented curricula have been criticized for not adequately meeting the needs of early adolescents (Beane, 1990; Harrington-Lueker, 1990). Efforts are underway to further develop career-oriented programs in the middle grades based upon the needs and characteristics of early adolescents. The success of these programs depends largely on the input and support of state education agency personnel.

Several characteristics and needs have been identified as being common to early adolescents. Recommendations for middle-grade education have been made based on those characteristics and needs. A major task of middle-grade education is to help students develop social skills (Lipsitz, 1984). To promote vocational development, the Carnegie Council on Adolescent Development (1989) recommended that middle-grade education provide courses designed to increase occupational awareness. However, Sale (1977) pointed out that specific job training is not appropriate at the middle-grade level. Others have suggested that middle-grade schools emphasize: a) hands-on learning to promote advancement from concrete to abstract thought capabilities, b) the acquisition of commonly-used practical skills, and c) the development of a personal value system (Kindred, Wolotkiewicz, Mickelson, Copenlin, & Dyson, 1976; Curtiss & Bidwell, 1977; Greenberg & Hunter, 1982).

Providing early adolescents opportunities to participate in student organizations and activities is a means of extending the curriculum, providing exploration of personal and career interests, and promoting the development of social and leadership skills (Kindred et al., 1976; Miller, 1988). Since early adolescents vary widely in their physical, intellectual, and emotional developmental levels, it is recommended that participation take precedence over competition in middle-grade student organizations (Brazee & Smalley, 1982). Rossetti, Padilla, and McCaslin (1992) recommended that the National FFA Organization not develop competitive activities for middle-grade students on a national level. However, George (1988) pointed out that there are benefits of competition for middle-grade students.

The number of career-oriented education programs has increased at the middle-grade level in recent years (Alexander & McEwin, 1989). Career-oriented education was defined for this study as planned course work and activities designed specifically to provide students one or more of the following attributes: a) ability to assess occupational aptitude, b) entry-level job skills, c) practical skills (e.g. basic home repairs, "life skills"), d) career awareness, e) knowledge needed to select future course work based on career interests, and f) opportunity to relate education to career roles. (The researchers chose to use the term "career-oriented education" instead of "vocational education" for this study. Career-oriented education was considered to be a more accurate description at the middle-grade level since the related programs are typically not designed for job training.) Career-oriented program areas include: a) agriculture, b) business, c) general career education, d) health occupations, e) home economics, f) marketing and distribution, g) technology, and h) trade and industrial.

Efforts to develop career-oriented programs at the middle-grade level depend greatly upon the support of state education agency officials. Factors which influence decisions affecting educational programs include educational organization philosophy, beliefs of external financial decision-makers, and beliefs of administrators within the organization (Boyle, 1981). Schools are political institutions; therefore, actions taken at the local level must fall within the parameters that have been politically determined (Saylor and Alexander, 1974). Essential to efforts aimed at understanding and improving middle-grade career-oriented programs was information on the status of current programs and knowledge of how the programs are perceived and supported by state education agency officials having responsibilities for the programs. This type of information was not available from state education officials.

PURPOSE AND OBJECTIVES

The research presented in this paper is part of a larger study designed to provide insight into the status of career-oriented education programs at the middle-grade level and the relevant perceptions of state education agency officials who have responsibility for the programs. The entire study included input from state directors of vocational education (N=50) and state supervisors (or consultants) in each career-oriented program area (N=352).

Objectives which guided the reported research were:

1. to describe middle-grade agricultural education programs in terms of prevalence and nature of courses; and
2. to determine the perceptions of state agricultural education supervisors regarding: a) past and future growth of agricultural education programs at the middle-grade level; b) the role of career-oriented education at the middle-grade level; c) the role of vocational student organizations (VSOs) at the middle-grade level; d) the degree to which career-oriented education can contribute to the social, intellectual, values, and vocational development of early adolescents; e) means of delivering career-oriented education; and f) competition within middle-grade VSOs.

PROCEDURES

The U.S. Department of Education January, 1992 directory of state officials with responsibilities for programs in agricultural education was used to identify state supervisors of agricultural education (N=50). Descriptive-survey research methodology was used to accomplish the objectives of this study. Through a mailed survey instrument, state supervisors described policies of their states and indicated their perceptions and opinions regarding various aspects of career-oriented education at the middle-grade level. Supervisors could provide more than one response on several of the survey instrument items.

Instrument validity was assured by a panel of experts that included graduate students in agricultural education and comprehensive vocational education. Reliability was determined by a test/retest procedure that included teacher educators in vocational education and current and former supervisors and administrators in the Ohio Division of Vocational and Career Education. The overall coefficient of stability from the test/retest was .93 and ranged from .66 to 1.00 on individual survey instrument items.

After a follow-up mailing to nonrespondents, 45 (90%) of the agricultural education supervisors returned their questionnaires. To account for response error in the overall study in which there were 69 nonrespondents, 10 (14%) of the nonrespondents were contacted by phone and asked to respond to selected questionnaire items. Their answers were compared to those of the respondents with a t-test; no statistically significant differences were found at alpha .05. In addition, early and late respondents in both the total responding sample and in responding sample of agricultural education supervisors were compared on their answers with a t-test, and no statistically significant differences were found at alpha .05; therefore, the responses received are generalized to the population (Miller & Smith, 1983).

RESULTS

Thirty-one (69%) of the agricultural education supervisors reported that students were enrolled in agriculture programs at the middle-grade level in their states; however, only 12 supervisors could provide enrollment data. Most of those 31 supervisors reported that the middle-grade programs were aimed at providing career exploration and/or developing practical skills. Table 1 shows that a majority of the supervisors reported that the number of middle-grade agriculture programs has increased over the past 10 years, and that they expected the trend to continue during the next 10 years.

When asked what should be the role of career-oriented education at the middle-grade level, roles identified by a majority of the supervisors included: a) providing students opportunities for career exploration, b) helping students assess occupational aptitude, c) providing students opportunities to explore personal interests, d) providing students with hands-on application of knowledge, e) guiding students toward a vocational curriculum, and f) providing students practical skills (see Table 2).

When asked what should be the role of VSOs at the middle-grade level, roles identified by a majority of supervisors included: a) developing student leadership skills, b) providing students opportunities to explore personal interests, c) developing student social skills, and d) providing instruction beyond what is received in the classroom. Forty-nine percent indicated that the role should include recruiting students into a high school vocational curriculum (see Table 3).

The supervisors were asked to indicate their level of agreement on a Likert scale with nine statements related to various aspects of career-oriented education programs at the middle-grade level (see Table 4). Mean ratings on the Likert scale of more than 4.5 indicated that the supervisors tended to agree that the programs can: a) provide early adolescents an understanding of the world of work; b) promote the social, intellectual,

Table 1
Past and Future Growth Trends of Middle-grade Agriculture Programs as Perceived by State Supervisors (n=43)

	Responses	
	f	%
In past 10 years:*		
Number of programs decreased	3	10%
Number of programs remained same	8	27%
Number of programs increased	19	63%
In next 10 years:		
Number of programs decrease	3	7%
Number of programs remain same	7	16%
Number of programs increase	28	65%
Not sure	5	12%

* Only those supervisors from states offering middle-grade agricultural education reported data in this category.

Table 2
Role of Career-oriented Education as Perceived by State Supervisors (n=45)

	Responses	
Role	f	%
Career exploration	41	91%
Help assess occupational aptitude	36	80%
Exploration of personal interests	36	80%
Hands-on application of knowledge	27	60%
Guide students toward vocational curriculum	26	58%
Provide practical skills	23	51%
Guide students toward a particular occupation	16	36%
Job skills training	4	9%
Other	1	2%

Table 3
Role of Middle-grade Vocational Student Organizations as Perceived by State Supervisors (n=45)

Role	Responses	
	f	%
Develop student leadership skills	37	82%
Provide opportunities to explore personal interests	33	73%
Develop student social skills	32	71%
Provide instruction beyond classroom	23	51%
Recruit students into high school vocational curriculum	22	49%
Should have no role	61	3%
Other	1	2%

and vocational development of early adolescents; and c) promote the development of a personal value system within early adolescents. The mean ratings also indicated that the supervisors tended to agree with the notion of career-oriented concepts being incorporated into middle-grade core courses (language arts, history, science, social studies, mathematics). Mean ratings of 3.5 to 4.5 indicated the supervisors tended to somewhat agree that the concepts should be taught in courses specifically designed for delivering career-oriented education. They also tended to somewhat agree that team and individual competition should be important parts of middle-grade VSOs (see Table 4).

CONCLUSIONS

According to state agricultural education supervisors, agricultural education programs (primarily of an exploratory nature) are offered to middle-grade students in most states. The number of programs has increased over the past 10 years, and the state supervisors expect this trend to continue. However, collection of enrollment data related to the programs does not appear to be a common practice.

The supervisors support the notion of career-oriented concepts being incorporated into core courses and being taught in specific career-oriented education courses. The supervisors have positive perceptions regarding the value of career-oriented programs toward promoting student development in areas indicated in the literature as important for early adolescents. The supervisors are generally in agreement with recommendations and philosophies expressed in the literature on early adolescent education (Kindred et al., 1976; Curtiss & Bidwell, 1977; Greenberg & Hunter, 1982; Lipsitz, 1984; Miller, 1988; Carnegie Council on Adolescent Development, 1989) regarding the roles of middle-grade programs and VSOs. The supervisors believe that the programs and VSOs should be primarily of an exploratory nature, allowing students to gain greater insight into personal and career interests and to develop social, leadership, and practical skills. The supervisors are somewhat reluctant to fully support

Table 4
Perceptions of State Supervisors Regarding Aspects of Career-oriented Education at the Middle-grade Level (n=45)

Statement	Mean	Standard Deviation
Career-oriented courses can help middle-grade students understand the world of work.	5.27	.75
Career-oriented courses can contribute to the intellectual development of middle-grade students.	5.16	.74
Career-oriented courses can contribute to the social development of middle-grade students.	5.00	.81
Career-oriented courses can contribute to the vocational development of middle-grade students.	5.00	.95
The concepts of career-oriented education should be incorporated into middle-grade core courses.	4.98	1.03
Career-oriented courses can help middle-grade students develop their personal values.	4.91	.87
The concepts of career-oriented education should be taught in courses specifically designed for that purpose.	4.35	1.36
Team competition should be an important part of middle-grade vocational student organizations.	4.16	1.59
Individual competition should be an important part of middle-grade vocational student organizations.	3.53	1.46

Scale
1 = strongly disagree
2 = disagree
3 = somewhat disagree
4 = somewhat agree
5 = agree
6 = strongly agree

competitive activities being an important part of middle-grade VSOs. This attitude toward middle-grade competition is reflective of concerns expressed in the literature regarding competition among early adolescents (Brazee & Smalley, 1982; Rossetti, et al., 1992). One notion supported by many of the supervisors that is not advocated in the literature is the role of career-oriented programs and VSOs being to guide students toward a high school vocational curriculum.

IMPLICATIONS AND RECOMMENDATIONS

The likely continued increase in number of middle-grade agriculture programs dictates that agricultural curricula and student activities be developed based on the educational needs and characteristics of early adolescents. A continued increase in the number of programs also dictates that practicing and future agriculture teachers be prepared to teach at the middle-grade level. Teacher educators in agriculture should be knowledgeable of practices and philosophies which guide middle-grade education and incorporate these aspects into existing courses. Teacher educators, state supervisors, and local educational personnel having professional development responsibilities should provide in-service activities related to early adolescent education to agriculture teachers currently in middle-grade schools and those who may assume the role of teaching at that level. Through in-service and supervisory activities, state supervisors should ensure that middle-grade agriculture programs are congruent with the goals and philosophies of middle-grade education.

State supervisors of agricultural education are supportive of middle-grade programs and are generally in agreement with the philosophy expressed in the literature on middle-grade education as it pertains to aspects of agricultural education. However, the view expressed by many supervisors that a role of career-oriented education and VSOs should be for student recruitment into particular high school vocational programs is not supported in the literature and has been criticized as a goal of middle-grade programs. State supervisors and agricultural educators at all levels should be supportive of middle-grade agriculture programs for the benefits the programs provide to early adolescents, not for the potential the programs have for recruiting students into a high school agriculture program.

Views expressed by the supervisors and the related literature regarding competitive activities in middle-grade student organizations should guide agricultural educators as they plan programs for early adolescents. Based on the literature and the opinions of the supervisors, competitive activities should not be a primary focus of middle-grade student organizations. However, competitive activities that are part of middle-grade VSOs should involve primarily team activities with opportunities for as many students as possible to participate. If competition is included in middle-grade VSOs, state supervisors and leaders of student organizations should develop competitive activities and reward systems that are appropriate for early adolescents.

The lack of middle-grade enrollment data reportedly available to supervisors indicates the need for improving (or in many cases implementing) data collection procedures for middle-grade programs. State-level personnel should encourage collection of such information.

The support of middle-grade agriculture programs by state supervisors bodes well for the future of the programs. Agricultural educators should use the information presented in this study as evidence of state-level support for middle-grade agriculture programs and as a means of securing local-level support for the programs.

With increased interest in middle-grade programs, research efforts should be aimed at improving education for early adolescents. Educators need research-based information on which to make decisions regarding middle-grade educational practices.

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STATE POLICIES AND STATE AGRICULTURAL EDUCATION SUPERVISOR PERCEPTIONS RELEVANT TO MIDDLE-GRADE AGRICULTURAL EDUCATION

A Critique

Joe W. Kotrlik, Louisiana State University--Discussant

This study addresses a group of individuals key to the future of agricultural education at all levels, including the middle school level. On a national basis, the future of middle school agricultural education programming is impacted heavily by the vision of state supervisors and program managers housed in state education departments.

The authors of the paper produced an orderly and focused review of the literature that served as an excellent theoretical base for this study. The review provided appropriate depth, considering the limited length of manuscripts allowed in the proceedings. The purpose and objectives were tightly worded and explicit, and the design of the study, instrumentation and data analysis procedures were suitable for this study. The use of test-retest reliability measures for the questionnaire was a strength of this study. The non-respondent issue was adequately addressed.

My main concerns are related to the population chosen for study and the analyses of the data collected. First, it seems that others involved in the leadership of agricultural education programs should have been involved in this study. Teacher educators and agriculture teachers will definitely have a role in the future of middle school programming.

Second, It appears that it would have been instructive and beneficial to the reader if the researchers would have made comparisons between supervisors from states that currently offer middle school agricultural education programming and those that do not. Since this is a simple population study of only forty-five supervisors, it would be easy to add the appropriate columns to the existing tables. I realize that this is not included in the objectives, but I must wonder why it was not included. It seems reasonable to hypothesize that the perceptions of supervisors who have experience with middle school programs may differ from the perceptions of those who do not have these programs in their states.

A separate concern arises from the fact that the study did not address a major issue relative to middle school programs--the availability of appropriate curricula for middle school programs that does not duplicate high school curricula. It appears that many states have not specifically addressed this issue.

I commend the researchers for undertaking this study and want to encourage them to conduct additional research relative to the perceptions held by state leaders in agricultural education. Middle school programs are important to the future of the total agricultural education effort and their efficacy must be addressed in the research, curriculum development and funding arenas.

AGRICULTURAL INSTRUCTION IN THE MIDDLE SCHOOL

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INTRODUCTION

Agricultural literacy has become a major concern for agricultural educators, educational administrators, agribusiness, and agricultural production personnel as well as federal and state agencies. As reported by the National Research Council (1988), this issue should be of importance to everyone in the United States.

> Too many Americans know very little about the social and economic relevance of agriculture in the United States, and agriculture is too important a subject to be taught only to a relatively small proportion of students enrolled in vocational agriculture. (p. 1)

The W. K. Kellogg Foundation (1984) reported that there were few issues of greater importance to the world than adequate food supplies, proper food use, and the knowledge of the components of the agricultural industry. Yet according to a study conducted by the Kansas State Center for Extended Services and Studies, less than 30% of 2,000 elementary, junior, and senior high students surveyed gave correct answers to relatively basic agricultural questions (Horn and Vining, 1986). As stated by Law (1990):

> As special interest groups revolving around issues such as animal rights, pesticide usage, soil and water conservation, and other environmental concerns gain more media and public attention, it becomes even more important that the general public have some background and understanding of not only what agriculture is all about, but on how it affects each person's life on a daily basis. (p. 5)

A regional committee of agricultural educators confirmed the need that agricultural literacy programs should be targeted at all youth, particularly school age youth at all grade levels, and adults (AATEA Central Region Committee on Agricultural Literacy, 1989). One objective stated for these programs was to identify what the average student or citizen should know about agriculture. Another objective was to define the concepts in agriculture that need to be universally taught in school systems. These concepts should include the importance of agriculture as a business and industry, the importance of agriculture and the environment, and the historical significance of agriculture (Kansas Foundation for Agriculture in the Classroom, 1984).

Perritt and Morton (1990) reported that most youngsters in urban and suburban areas receive little exposure to agriculture. They also concluded that one of the growing responsibilities that agricultural educators face in the 1990's is to develop a positive association with agriculture in the public sector.

There has been a national move to implement programs to improve the agricultural knowledge and attitude of individuals from kindergarten through the adult level. These programs have been primarily delivered through the public school system and can range from merely incorporating agricultural information into the current curriculum to complete courses in education about agriculture.

Christensen suggested (1988) that in the evaluation of a new curriculum, an attitude scale and an achievement test might be given at the beginning of the school year. The new curriculum is then introduced to the students. At the end of the school year, the attitude test and achievement test are again administered. The pre- and post-test scores on the attitude scale and achievement scale are examined for change. A significant change between these two scores may be attributed to the new curriculum. Because learning is one of the major goals of education, measures of amount learned (i.e., achievement) are often used in educational research. Although achievement tests have been criticized on social grounds, they are probably the most valid, reliable, and useful measures available to the educational researcher (Borg and Gall, 1989). Cronbach and Furby (1970) reported that differences in scores are thought to be worth estimating if the aims are to provide a dependent variable in an experiment on instruction or some other attempt to change behavior or beliefs, or to provide a measure of growth rate or learning rate that is to be predicted.

An assessment of the middle school students' knowledge about agriculture and attitude towards the subject, through the administering of an agricultural knowledge instrument (achievement test) and an agricultural attitude survey, provides a challenge. Such an evaluation could give direction for curriculum improvement and help identify subgroups which may profit from instruction about agriculture.

Little information was found related to outcomes about agricultural literacy programs for younger students. Therefore, the focal point of this study was to provide information about the agricultural literacy of selected middle school students.

PURPOSE OF THE STUDY

The purpose of this study was to assess if middle school students' agricultural knowledge and attitude scores differed after being exposed to an agricultural curriculum.

The general research question was: Did the middle school students' agricultural knowledge and attitude pre-test scores differ from the students' agricultural knowledge and attitude post-test scores after being exposed to varying lengths of agricultural instruction?

More specific questions addressed by this study were:

1. Did the middle school students' agricultural knowledge pre-test scores differ from post-test scores?

2. Did the middle school students' agricultural attitude pre-test scores differ from post-test scores?

3. Did the middle school students' agricultural knowledge pre-test scores differ from the post-test scores in relation to the various lengths of agricultural instruction?

4. Did the middle school students' agricultural attitude pre-test scores differ from the post-test scores in relation to the various lengths of agricultural instruction?

Related null hypotheses were formulated for purposes of this study.

PROCEDURES

This study was conducted as a single group pre-test, post-test quasi-experimental design. As reported by Borg and Gall (1989), where random assignments of subjects is not possible, particularly in field studies, the use of a quasi-experimental design is required. There were two independent variables and two dependent variables involved in this study. The independent variables included: length of instruction, either 6, 9 or 18 weeks, and the test type of either a pre- or post-test. The dependent variables included the achievement scores from the Agricultural Knowledge Assessment Instrument and the attitude scores derived from the Agricultural Attitude Survey.

The population for this study consisted of all the students in Missouri middle schools which were taught the Exploring Agriculture in America (Humphrey, Birkenholz, and Harris, 1991) curriculum. The sample for this study consisted of the middle school students who were enrolled in classes which offered agricultural instruction for the 1990-91 school year. These classes were comprised of 7th and 8th graders and included 264 students.

Each school received, in addition to the curriculum materials, copies of the Agricultural Knowledge Assessment Instrument, the Agricultural Attitude Survey, machine scoreable answer sheets, and instructions for the administration of the tests. These instruments were administered before the first day of instruction using the new curriculum and then again following the completion of the 6, 9, or 18 weeks or agricultural instruction. The instructors were the current teachers from the secondary programs.

The Agricultural Knowledge Assessment Instrument was a revised version of the instrument used in the Kansas State agricultural literacy survey (Horn and Vining, 1986) and was comprised of 40 multiple choice questions. It was reviewed for construct and content validity by a panel of experts and analyzed using the Kuder-Richardson Formula 20 which yielded a reliability estimate of .83.

The Agricultural Attitude Survey was a modified form of the "Attitude Toward Any School Subject" survey by Remmers (1986) using a seven point Likert-type scale and the term "agriculture" instead of "subject matter." The internal consistency reliability for the 20 item Agricultural Attitude Survey instrument used in a similar study was estimated at .95 using Cronbach's alpha (McCaskey, 1987).

ANALYSIS OF DATA

A multivariate analysis of variance procedure was employed using the dependent variables of achievement scores and attitude scores to test for significance between the length of instruction, test type, and interaction. The MANOVA, followed when appropriate by an analysis of variance for repeated measures procedure, was used to test the hypotheses. The repeated measure was the scores on the pre-test and post-test. As reported by Brogan and Kutner (1980), a common analysis for a pre-test/post-test design was to calculate a difference score for each subject as a relative difference measure. Another method was to view the pre-test and post-test as a repeated measures/split plot design. They also indicated that since the difference-score analysis was embedded in the repeated measures analysis, the repeated measures analysis provided more information about the data.

RESULTS

Of the 264 students, 50.8% were male and 49.2% female. The largest percentage of the students (39.8%) lived in small towns of less than 2,500, while 27.2% lived on farms of more than 10 acres. A total of 57.5% of the students had lived on a farm.

A multivariate analysis of variance procedure using the Pillai's Trace value at the .05 alpha level was employed with the dependent variables of agricultural knowledge and agricultural attitude and the independent variables of length of instruction and test type. The analysis yielded a partial correlation of .126 for the dependent variables. Although this correlation was low, it was judged to be appropriate to run the MANOVA. The MANOVA (Table 1) yielded a Pillai's Trace value of .236 and a significant *F* of 38.4 (*df* = 2,249; *p* = .001) for the independent variable of test type.

Table 1

Multivariate Analysis of Variance for Knowledge, Attitude, and Interaction

Source	Pillai Trace	*F*	*df*	Prob > *F*
Instruction length	.018	1.13	4,500	.342
Pre-test and post-test	.236	38.38	2,249	.001
Length by test type	.024	1.54	4,500	.190

The first null hypothesis of no significant difference in pre-test and post-test knowledge scores was rejected indicating that there was a significant difference (*F* = 66.2; *p* = .001) in the agricultural knowledge mean scores of the students (Table 2). The mean knowledge scores improved from 26.3 to 28.6.

Table 2

Analysis of Variance for Knowledge

Source	Sum of squares	*df*	*F* Value	Prob > *F*
Instruction length	2.575	2	.02	.987
Error	15550.650	265		
Pre-test and post-test	831.305	1	66.17	.001
Length by test type	52.132	2	2.07	.128
Error	3140.563	250		

The second null hypothesis of no significant difference in pre-test and post-test attitude scores was rejected indicating that there was a significant difference (*F* = 18.5; *p* = .001) in the agricultural attitude mean scores of the students. The mean attitude scores improved from 103.5 to 108.3.

A MANOVA procedure was used to test for significance among the three groups based on length of instruction. The MANOVA yielded a Pillai's trace value of .018 and an estimated *F* value of 1.13 (*df* = 4,500; *p* = .342) as indicated in Table 1.

The third null hypothesis of no significant difference in knowledge scores by length of instruction was not rejected as there was not a significant difference among the mean scores of students regardless of the length of instruction involved.

The fourth null hypothesis of no significant difference in attitude scores by length of instruction was not rejected as there was not a significant difference in the attitude mean scores of students whether they received 6 weeks, 9 weeks, or 18 weeks of instruction.

Table 3

Analysis of Variance for Attitude

Source	Sum of squares	*df*	*F* Value	Prob > *F*
Instruction length	692.708	2	.76	.470
Error	121330.743	265		
Pre-test and post-test	2873.859	1	18.50	.001
Length by test type	385.449	2	1.24	.291
Error	38825.486	250		

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions were drawn concerning the effectiveness of instruction about agriculture in the middle school. (a) There is a change in the agricultural knowledge and agricultural attitude of the students after they receive instruction about agriculture. (b) The length of time middle school students receive agricultural instruction between 6 and 18 weeks does not affect the change in agricultural knowledge or attitude.

The finding that there was not a strong ($r = .126$) significant relationship between the agricultural knowledge and the agricultural attitude of the middle school students indicated that although the students may have good knowledge of agriculture, they may not necessarily have a positive attitude towards the subject. Conversely, they may have a favorable attitude towards agriculture but may not possess good understanding or knowledge of the subject. This finding strengthens the need for agricultural literacy programs for all students. Improving the agricultural knowledge of individuals may not change their attitude but it should allow them to make competent judgments about the subject. As reported by the USDA (1984), it is imperative that students have the information to fully appreciate the impact agriculture has on our society.

The significant differences found in the knowledge and attitude mean scores of the middle school students indicated that study about agriculture did indeed have a positive effect on the students. Although this study found a weak relationship between achievement and attitude scores, this finding suggests that both of these variables can be significantly altered through the use of an agricultural literacy curriculum.

The fact that in this study no significant difference was found in the achievement mean scores due to length of instruction, indicated that exposure to an agricultural education curriculum for even as short a period as 6 weeks can have an impact on middle school students' agricultural knowledge. This finding supported Birkenholz' (1990) recommendation that a curriculum could be designed to accommodate a module within an existing course or to encompass only a quarter or semester long program.

The results of this study indicate that there can be an improvement in the agricultural attitude of middle school students through instruction about agriculture. This age group of students represents an important educational stage for developing an increased understanding and appreciation about agriculture. Those persons interested in increasing the agricultural literacy of the general population should continue promoting the teaching about agriculture.

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AGRICULTURAL INSTRUCTION IN THE MIDDLE SCHOOL

A Critique

Joe W. Kotrlik, Louisiana State University--Discussant

I commend the authors for addressing the agricultural knowledge and attitudes of middle school students. This is a worthwhile and timely topic. It is especially important in view of the agricultural education profession's diversification goals and related program redesign efforts.

I applaud the authors for providing a very strong, well organized review of literature that was written with appropriate depth and scope. The review provided an appropriate foundations for the study itself and the procedures selected for use in the study.

The authors refer to a population and sample for this study. They describe the population as " . . . all the students . . . who were enrolled in classes . . .". They describe the sample as " . . . students who were enrolled in classes . . . for the 1990-91 school year." If this was an attempt to treat students in classes during the 1990-91 school year as a sample in time in order to justify the use of inferential statistics, I question this procedure. It appears to me that this is an issue of total population vs accessible population.

Improving knowledge scores from 26.3 to 28.6 may be statistically significant but I question the practical significance, considering the average instructional length was 12 weeks. This leads me to question whether the test used to measure knowledge was valid as it was used and as claimed by the authors. If the test is valid as used, the authors should have concluded that this instructional program is of questionable value and effectiveness. I would like to have the actual means and standard deviations for the tests. It would have helped the reader if the authors would have indicated whether the scores were the number correct out of the total number of questions (e.g., 28.6 out of 40) or whether this score represented the percentage correct. Likewise, for the attitude scale, the manuscript does not tell me how the scores of 103.5 and 108.3 were derived. I assumed that they were based on a possible seven points per item multiplied by 20 items for a possible score of 140.

I question the conclusion that the low correlation between agricultural knowledge and attitude "strengthens the need for agricultural literacy programs for all students. The interpretation of this coefficient (r = .126) ranges from no correlation to low correlation, depending on which set of descriptors was used (e.g., Davis, or Hinkle, Wiersma & Jurs). This conclusion cannot be supported by the data presented in this manuscript. I was disappointed that teacher and student variables were not incorporated in the design of the study. Where knowledge test scores are involved, the inclusion of socioeconomic variables frequently explains statistically and practically significant portions of the variance.

I commend the writers for conducting this study and encourage them to conduct additional research relative to the impact of agricultural instruction on the knowledge and attitudes of middle school agricultural education students.

A core curriculum for a National Middle School Agricultural Education Program
An approach to curriculum development using a Modified Delphi Technique

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INTRODUCTION

During the next decade, students enrolled in middle grade education in the United States will grow from 17.3 million in 1990 to 20 million by the year 2000 (Exter, 1992). Middle grade schools will increase to 20,000 by the year 2000 (George, 1988). Similar growth has occurred and will continue in middle grade agricultural education programs in an effort to provide early exposure to the world of agriculture and to increase self understanding in the preparation for careers. Currently, over 30 states endorse through financial support, exploratory agricultural programs for middle school students at the local level. In 1985 over 22 percent of all secondary agricultural education instructors taught one or more junior high/middle school courses in agriculture (Phipps & Osborne, 1988).

Developing a framework for a middle school agricultural education curriculum is the first step in furthering the continuity and focus of middle school agricultural education programs. A study that examined the nationwide enrollment of middle school enrollment in agricultural education (Rosetti, Padilla, & McCaslin, 1992) recommended that the National FFA Organization, the U.S. Department of Education, and the U.S. Department of Agriculture should encourage development of a middle and/or junior high school agricultural education core curricula. The study also recommended that the designers of middle school programs should ensure that the middle school programs are distinct from senior high school programs. This study used the delphi technique to develop the framework for a middle school agricultural education curriculum. Finch and Crunkilton noted that (1989, p. 154) "Obviously, this technique would be of much value when persons desire to reach consensus regarding the content of a particular curriculum."

The Task Force on Middle School Agricultural Education suggested that because of the nature and maturity level of the middle school student, the core curriculum follow two themes: 1) agricultural literacy and 2) exploration of agricultural topics. Waidlech (1992) stated, "Curriculum designers and instructors need to build courses that incorporate agricultural literacy with personal development and interdisciplinary connections in a one-semester or shorter program." Career exploration and applied science were two agricultural curriculum areas recommended for the middle school in The National Academy of Sciences report, Understanding Agriculture: New Directions for Education (National Research Council, 1988).

In order to facilitate systematic instruction, increased continuity, and the development of instructional materials and media, the core curriculum for a middle school program that focuses on agricultural literacy and exploration needs to be determined. The identification of subject areas and topics for a middle school agricultural literacy and exploration core curriculum would further unify agricultural educators in middle school agricultural education efforts.

PURPOSES AND OBJECTIVES

The fundamental purpose of this study was to develop a document that could provide agricultural educators with the subjects and topics that constitute the core curriculum for a middle school agricultural education program.

The specific objectives of this study were:

1. To determine the agricultural literacy subject areas and topics which constitute the framework of a middle school agricultural education core curriculum.

2. To determine appropriate exploratory subject areas and topics of agricultural which constitute the framework of a middle school agricultural education core curriculum.

PROCEDURES

This investigation was conducted in three parts, each moving closer to satisfying the objectives. Delphi was the research procedure most congruent with purpose and objectives of the study (Dalkey, 1969; Helmer, 1967; Linstone and Turoff, 1975). The Delphi technique is a method of eliciting and refining group opinions. According to Helmer (1966), variants of the Delphi can be applied to all phases of educational planning, including curriculum reform.

Pre-data collection

After reviewing the literature and related research, a letter requesting a minimum of two nominees to the Delphi panel was sent to presidents of NVATA State Associations in all 50 states The letter asked that nominees possess an interest in middle school agricultural education; have the time, in the nominator's estimation, to devote to the study; and be a middle school agricultural education teacher. Of the 50 panelists nominated from 26 states, 34 initially agreed to participate in the study. From the initial 50 panelists, 21 participated in all phases of the study. The process was iterative. Dalkey (1969), in extensive studies of the Delphi technique, found reliability to be a function of group size. According to Dalkey, when the number of participants per group was greater than thirteen, question of process reliability were satisfactorily answered; mean correlations were greater than .80. The number of panelists involved in all phases of this study surpassed the number needed to satisfactorily answer the question of process reliability.

Preliminary questions were determine through formalized discussions with members of the middle school task force on agricultural education. Questions asked of panelists were developed and validated through an internal panel of experts. The basis for questions related to the agricultural literacy subject areas and topics appropriate for a middle school agricultural education core curriculum were derived from a national study (Frick, 1990) that identified the subject areas of agricultural literacy for the general public. The second objective of the study was initially addressed by asking panelists to submit the exploratory subjects they thought were appropriate for a middle school agricultural education core curriculum. Subsequent questionnaires were administered to panelists to refine agricultural literacy and exploratory subject areas and topics that would constitute a middle school agricultural education curriculum.

Rating of Subject Areas and Topics

Subject areas and topics offered and generated were collected through the objective-driven Delphi instruments. Individually prepared follow-up letters were sent to encourage participation. The researcher eliminated duplicate subject areas and topics to refine the lists generated by delphi panelists. Panelists were asked to respond using a seven-point Likert-type scale to describe their value regarding the importance of a subject area and topics for a middle school agricultural education core curriculum. A rating of seven on the Likert scale represented a teacher's opinion of 'most important' regarding subject and/or topic importance whereas a rating of one represented a teacher's opinion of 'least important'. Summary statistics were then calculated for each set of data in the study.

ANALYSIS OF DATA

Due to the nature of the chosen research procedures, the treatment of data involved the use of frequencies and percentages. Frequency distributions were used to distill and refine the subject areas and topics submitted for agricultural literacy and exploratory themes in a middle school agricultural education core curriculum. Those subject areas and topics where 50% of the panelists chose to rate the subject area or topic as 'important' (rating of 6) or 'most important' (rating of 7) represented consensus and were included in the final lists of subject areas and topics that constituted a core curriculum for middle school agricultural education. Each panelist received the percentage of 'important' or 'most important' and their initial rating. The panelists were instructed to reevaluate the statements in light of the additional information provided through the summary statistics. Findings were used to develop a consensus document that can provide the direction and continuity needed in a national core curriculum for middle school agricultural education.

RESULTS

Agricultural Literacy Subject Areas and Topics for Middle School Agricultural Education

Table 1 presents the frequencies and percentages of four agricultural literacy subject areas which panelists arrived at consensus. The delphi process and analysis reduced the list from eleven subject areas to the four remaining. Topics that fell under the four agricultural literacy subject areas were rated by panelists. Table 2 presents the agricultural literacy topics that were retained if 50% or more of the panelists rated the topic an 'important' (rating of 6) or a 'most important' (rating of 7). The delphi process and analysis of data reduced the list of topics from 23 to the 17 remaining for the four agricultural literacy subject areas. The remaining middle school agricultural literacy subject areas and topics represent consensus among panelists on an agricultural literacy core curriculum for middle school agricultural education.

Exploratory Subject Areas and Topics for a Middle School Agricultural Education Curriculum

Table 3 presents the frequencies and percentages of 6 middle school agricultural exploratory subject areas which panelists arrived at consensus. The delphi process and analysis reduced the list from the 22 panel-generated subject areas to the six remaining. Topics that fell under the 6 agricultural exploratory subject areas were rated by panelists. Table 4 presents the agricultural exploratory topics that were retained if 50% or more of the panelists rated the topic an 'important' (rating of 6) or a 'most important' (rating of 7). The delphi process and analysis of data reduced the list of topics from 90 to the 42 remaining for the six subject areas. The remaining middle school agricultural exploratory subject areas and topics represent consensus among panelists on an agricultural exploratory core curriculum for middle school agricultural education. The 22 subject areas and 90 topics provide some indication about the broad expanse of agricultural education content at the middle school level.

Table 1. Agricultural Literacy Subject Areas Refined by Middle School Delphi Panelists

Subject Area	Most Important	Percent Responses
Agriculture's important relationship with the environment	7 6	78.6%
Agriculture's important relationship with natural resources	7 6	64.3%
Societal significance of agriculture	7 6	53.6%
The global significance of agriculture	7 6	57.1%

Table 2. Agricultural Literacy Topics by Subject Area Refined by Panelists

Subject Area	Most Important	Percent Responses
AGRICULTURE'S IMPORTANT RELATIONSHIP WITH THE ENVIRONMENT		
The Agriculturalist's role in protecting the environment	7 6	75%
The effect of agriculture on the environment	7 6	91.7%
Opinions and Perceptions	7 6	54.2%
Chemicals		
Positive Effects of Agriculture on the Environment	7 6	83.4%
Negative Effects of Agriculture on the Environment	7 6	62.5%
The Environment's Close Relationship with Agriculture	7 6	91.6%
AGRICULTURE'S IMPORTANT RELATIONSHIP WITH NATURAL RESOURCES		
Conservation of Natural Resources Sustainable Agriculture	7 6	87.5%
Stewardship of Agriculture	7 6	66.7%
Pollution and Depletion of our Natural Resources	7 6	62.5%
Codependent Relationship between Agriculture and Natural Resources	7 6	83.4%
Importance for Agriculture	7 6	83.4%
SOCIETAL SIGNIFICANCE OF AGRICULTURE		
Society's Lack of Awareness	7 6	79.2%
Agriculture's Effect on Society	7 6	87.5%
Food Efficiency	7 6	66.5%
THE GLOBAL SIGNIFICANCE OF AGRICULTURE		
Global Food Economics	7 6	70.8%
Global Hunger and Food Distribution	7 6	70.8%

Table 3. Refined List of Subject Areas Generated by Middle School Delphi Panelists

Subject Area	Most Important	Percent Responses
Food Safety/Consumer Relations	7 6	57.7%
Leadership/Human Relations	7 6	57.7%
Careers and Future of Agriculture	7 6	88.5%
Agricultural Science and Experimentation	7 6	57.7%
Agricultural Vocabulary	7 6	57.7%
Agricultural Benefits to World	7 6	73.1%

Table 4. Middle School Topics by Subject Area as refined by Panelists

Subject Area	Most Important	Percent Responses
FOOD SAFETY AND CONSUMER RELATIONS		
What is on a food label?	7 6	52.4%
Discussion of Food-From production to consumption	7 6	80.9%
Safe use of chemicals in food production	7 6	66.7%
Dissolving myths of chemical residues	7-6	66.7%
The role of food inspection and grading in assuring a safe food supply.	7 6	52.4%
LEADERSHIP AND HUMAN RELATIONS		
Importance of values	7 6	61.9%
Opportunities of leadership positions in agriculture	7 6	76.2%
Need for cooperation & idea sharing in research & business	7 6	52.4%
Public Speaking	7 6	66.7%
Communication of the importance of ag through the types of media	7 6	66.7%
How important leadership is to ourselves and others around us	7 6	80.9%
Leadership and the FFA	7 6	66.7%
Basic conduct of meetings	7 6	52.4%
FFA Leadership & Parliamentary Procedure	7 6	52.4%
The effects of leadership skills on future career opportunities	7 6	81.0%
CAREERS AND FUTURE OF AGRICULTURE		
What the FFA can do for you!	7 6	52.4%
Requirements of job entry	7 6	52.4%
Agriculture's future & how can I prepare for an agricultural career?	7 6	76.2%
Occupational opportunities for agriscience in the 21st century	7 6	80.9%
Agricultural career areas and related high school and college courses	7 6	61.9%
Diversity of ag careers	7 6	76.2%
Ag careers can meet your interests	7 6	85.7%
On Farm and Off Farm Careers	7 6	52.4%
Career opportunities in animal science, plant science, etc.	7 6	57.1%
The impact of biotechnology on agriculture careers	7 6	76.2%
AGRICULTURAL SCIENCE AND EXPERIMENTATION		
Relate to Food Science, Ag. Chemicals, & Ag. Products	7 6	52.4%
Student experiments on IPM, Food Science, and Plant Physiology	7 6	80.9%
Plant germination and growth	7 6	71.4%
Daily benefits of agriculture research	7 6	57.2%
AGRICULTURAL VOCABULARY		
Crossword puzzle of common terms	7 6	57.1%
Agriculture terms(general, crops, livestock, soils, etc.)	7 6	57.1%
Agriculture literacy "We all should know"	7 6	90.5%
Basic literacy of misunderstood agriculturally related terms	7 6	52.4%
What terms should students know in agriscience?	7 6	52.4%
Terms found in teaching plant, animal science and agribusiness	7 6	52.4%
AGRICULTURAL BENEFITS TO THE WORLD		
What benefits can/do I receive from agriculture?	7 6	80.9%
Agriculture-"It keeps you and me on top of the world."	7 6	52.4%
New discoveries that are used in human medicine	7 6	57.1%
Show diversity of finished products from plants and animals	7 6	61.9%
Dependency of world on agricultural production and processing	7 6	57.1%
Describe how important ag is to your area and the world	7 6	61.9%
Effect of the world's people without farmers or agricultural workers?	7 6	61.9%

Note: Percent responses represent the percentage of the panelists who rated a subject area or topic 'most important' or 'important' (rating of 7 or 6).

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions were drawn from the results of the study:

1. A core curriculum for middle school agricultural education encompasses 4 agricultural literacy subject areas and 6 agricultural exploratory subjects.

2. The 17 agricultural literacy topics and 43 agricultural exploratory topics that fall under their respective subject areas provide further structure for curriculum development. The topics can be used to develop modules about specific agricultural topics that are appropriate for the middle school grade level.

3. The subject areas and topics identified through this study provide the direction and continuity needed to develop a nationwide set of instructional materials for use in middle school agricultural education programs.

The following recommendations were derived from the conclusions:

1. Instructional materials should be developed with the middle school student in mind. The transcescent's interests, concern's and maturity level should be highly considered in the final development of materials.

2. A study that would determine a middle school student's interest in the subject areas and topics presented is highly recommended.

3. As more middle school programs are started, a document that illustrates various effective teaching strategies for the middle school agricultural education instructional materials should be developed and distributed to teachers.

4. State education agencies and teacher education programs should design inservice and preservice programs to prepare current and prospective teachers for teaching middle school agricultural education program content.

5. Designers of middle school agricultural education programs should ensure that program content is distinct from senior high school programs.

6. The identification of where the subject areas and topics can be integrated in the total middle school curriculum is highly recommended.

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A CORE CURRICULUM FOR A NATIONAL MIDDLE SCHOOL AGRICULTURAL EDUCATION PROGRAM: AN APPROACH TO CURRICULUM DEVELOPMENT USING A MODIFIED DELPHI TECHNIQUE

A Critique

Joe W. Kotrlik, Louisiana State University--Discussant

I would like to commend the author for addressing the development of curricula for middle school agricultural education programs. As I read and evaluated the other three manuscripts in this session, it was apparent to me that the missing link crucial to the future of middle school programming was a well designed and marketable middle school curriculum.

The objectives of the study were limited in scope and depth but appear to be appropriate since this is a Delphi study. The two objectives should be combined in a single objective since there is no apparent rationale to separate them.

It was difficult to follow the section on research procedures. This section needs a complete rewrite. The author claims to have used the Delphi technique but also indicates that the questions were developed and validated through a panel of internal experts. Finch and Crunkilton (1989) indicate that a basic tenet of the Delphi technique is to select experts for your panel and then derive the initial subject matter/questions from a survey of the panel. The results of this initial survey are then revised during at least three additional iterations using the expert panel, not internal experts. Since it appears that the author did not use the Delphi technique appropriately, the author should refer to this technique as a modified Delphi and explain how the technique was modified. Information should also be provided about the qualifications of the "internal experts" who served in this role.

The review of literature was limited in depth and scope. Although the research literature is limited in this area, more has been written about middle school agricultural education programs and curricula than the review of literature would lead one to believe.

The results section needs to be completely rewritten. Tables 1-4 should be reduced to two tables. I do not see the need for the column titled "Most Important." Was this column supposed to contain data other than "7 6". Also, I assume that the "Percent Responses" column reports the percent of the panel who rated each item as either a level 6 or 7. This note is included on Table 4 but not on Tables 1-3. The manuscript needs to be edited before submitting to a quality journal. "Fifty dollar" words (transcescent) need to be replaced by commonly understood words.

I commend the author for conducting this Delphi study of middle school agricultural education curriculum. I urge and encourage him to continue to refine the results of this Delphi research to aid in the further development of middle school agricultural education programming.

MOTIVATOR-HYGIENE THEORY AND THE JOB SATISFACTION OF SIX TAXONOMIES OF AGRICULTURAL EDUCATION TEACHERS

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INTRODUCTION

Job satisfaction can be described as "the condition of contentment with one's work and environment, denoting a positive attitude" (Wood, 1973, p. 8). According to Lawler (1977), the extent to which people are satisfied with their jobs should be a societal concern, as work experiences have profound effects on both the individual and on society as a whole.

Several researchers (Davis & Newstrom, 1989; Lawler, 1977; Porter & Steers, 1977; Newcomb, Betts, & Cano, 1987) have attributed job turnover, absenteeism and job burnout to a lack of job satisfaction. Yet, the impact of job dissatisfaction goes far beyond the previously mentioned consequences. For instance, Mowday (1984) suggested that the negative effects of job turnover on organizations may include: increased costs to recruit, select, and train new employees; demoralization of remaining employees; negative public relations; disruption of the day-to-day activities; and decreased organizational opportunities to pursue growth strategies. In order to curb the negative consequences associated with job dissatisfaction, a thorough understanding is required as to which factors lead to job satisfaction and which create job dissatisfaction (Davis & Newstrom, 1989; Mowday, 1984; Berns, 1989).

Many theoretical models have been posited for studying job satisfaction, however the Motivator-Hygiene Theory developed by Herzberg, Mausner, and Snyderman (1959) will provide the theoretical framework for this study. Motivator-Hygiene theory states that one distinct set of factors is associated with job satisfaction while another separate set of factors is associated with job dissatisfaction (Herzberg et al., 1959). The factors associated with job satisfaction were labeled "motivators" by Herzberg et al. (1959) and included achievement, advancement, recognition, responsibility, and the work itself. The "motivator" factors were specifically measured in this study and were referred to as job satisfier factors.

PURPOSE AND OBJECTIVES

The purpose of this study was to investigate the overall job satisfaction of six taxonomies of secondary agriculture teachers and the specific factors associated with job satisfaction. The research objectives were to:

1. Describe and compare selected demographic characteristics of secondary agriculture teachers across taxonomies.
2. Describe relationships between selected demographic characteristics of agricultural education teachers.

3. Describe and compare the overall job satisfaction and selected job satisfier factors for agricultural education teachers across taxonomies.
4. Describe relationships between selected job satisfier factors (achievement, advancement, recognition, responsibility, and the work itself) and the overall job satisfaction of secondary agriculture teachers by taxonomy.

PROCEDURES

The population for this descriptive-correlational study was all secondary teachers of agricultural education in Ohio (N = 558). The sample consisted of a census of female secondary agriculture teachers (N = 45) and male secondary agriculture teachers in the taxonomies of Agricultural Business (N = 29), Farm Business Planning and Analysis (FBPA) (N =27), and Natural Resources (N = 13). A random sample of male secondary teachers of agriculture was drawn from Agricultural Mechanics (N = 81, n = 70), Horticulture (N = 71, n = 60), and Production Agriculture (N = 292, n = 170). Cochran's (1977) formula for a 5% chance of error was used to determine the sample sizes. The total sample consisted of 414 secondary agricultural education teachers.

Wood's (1973) instrument constituted Part I of the questionnaire and provided the basis for describing teacher perceptions regarding the following job satisfier factors: achievement, advancement, recognition, responsibility, and the work itself. The instrument was a Likert type scale with responses ranging from 1 (very dissatisfied) to 6 (very satisfied). Teachers were asked to select responses that best represented their level of satisfaction.

The Brayfield-Rothe "Job Satisfaction Index", as modified by Warner (1973), was used to measure job satisfaction when all facets of the job were considered. The instrument was a Likert type scale with responses ranging from 1 (strongly disagree) to 5 (strongly agree). Teachers were asked to select responses that best represented how they felt about their job. The "Job Satisfaction Index" constituted Part II of the questionnaire. Part III of the questionnaire consisted of demographic variables.

Content and face validity were established by a panel of experts consisting of teacher educators, teachers of agriculture, and graduate students. The instrument was pilot tested with a group of agricultural education teachers not included in the sample. Cronbach's alpha for the questionnaire was .89.

Five days prior to mailing the complete questionnaire package which contained a cover letter, questionnaire, and stamped return envelope, a postcard was sent to those in the sample to announce the forthcoming package. A postcard reminder was sent to non-respondents ten days after mailing the initial package. A second complete package was mailed to non-respondents seven days after the first follow-up postcard. A final follow-up postcard was sent five days after the mailing of the second complete package. The response rate was 81%. Non-response error was controlled by comparing early to late respondents (Miller & Smith, 1983). No significant differences were found between the early and late respondents.

All data were analyzed using the Statistical Package for the Social Sciences, Personal Computer version (SPSS/PC+). The statistical procedures used were descriptive (frequencies, percentages, means, standard deviations, and correlations) and inferential (F-ratios, and Chi-Square). The alpha level was set a priori at .05. All correlation coefficients were interpreted utilizing Davis' (1971) descriptors.

RESULTS

Of those teachers included in the analysis, most were Production Agriculture teachers followed by teachers of Horticulture, Agricultural Mechanics, Agricultural Business, FBPA, and Natural Resources (Table 1). Table 1 further shows that the mean age for the agriculture teachers ranged from 37.37 years to 44.85 years. One way analysis of variance and the Tukey Post-hoc procedure revealed that Agricultural Mechanics teachers were significantly older than teachers of Production Agriculture and Horticulture.

The mean number of years teaching experience for the six taxonomies of agriculture teachers ranged from 10.76 years to 15.89 years. Using one way analysis of variance and the Tukey post-hoc procedure, it was found that Agricultural Business teachers had significantly more years of teaching experience than Agricultural Mechanics teachers (Table 1). Additionally, teachers in the six taxonomies averaged 6.88 years to 10.64 years of service in their current positions. No statistically significant differences were found among the six taxonomies of agriculture teachers in regards to the number of years teachers had been in their current positions (Table 1).

Insert Table 1 about here

It was found that Natural Resources teachers tended to have Master's degrees, Production Agriculture teachers were most likely to hold Bachelor's degrees, and Agricultural Mechanics teachers were more likely to have only a high school diploma. A statistically significant moderate relationship (Cramer's V = .45) was found to exist between taxonomy and degree status (Table 2). Data also indicated that Agricultural Business teachers were more likely to be tenured than teachers in other taxonomies while FBPA Teachers were least likely to have tenure. A low association (Cramer's V = .18) was found to exist between taxonomy and tenure status (Table 3).

Insert Tables 2 and 3 about here

In regards to overall job satisfaction, FBPA teachers had the highest mean score followed by teachers of Natural Resources, Production Agriculture, Horticulture, Agricultural Business, and Agricultural Mechanics. Mean scores on the overall job satisfaction scale did not differ significantly across the six taxonomies of agriculture teachers (Table 4).

Insert Table 4 about here

Teachers in the taxonomies of Agricultural Mechanics, FBPA, Horticulture, Natural Resources, and Production Agriculture on average indicated that advancement was the least satisfying of the job satisfier factors. Agricultural Business teachers, however, considered recognition to be the least satisfying factor. Teachers in the taxonomies of Agricultural Business, FBPA, and Horticulture perceived the work itself as being the most satisfying factor. Agricultural Mechanics and Production Agriculture teachers were most satisfied with responsibility, but Production Agriculture teachers were equally satisfied with recognition (Table 5).

One way analysis of variance and the Tukey post-hoc procedure revealed that FBPA teachers provided significantly greater scores than Horticulture and Agricultural Mechanics teachers on achievement. Also, FBPA teachers provided significantly greater scores than Horticulture and Production Agriculture teachers on the work itself (Table 5).

Insert Table 5 about here

Pearson correlations were calculated to describe the relationships between agriculture teachers' overall level of job satisfaction and the job satisfier factors. The coefficients ranged in magnitude from negligible to substantial. The relationship between overall job satisfaction and the work itself was statistically significant for Agricultural Business teachers, and overall job satisfaction and recognition were significantly related for Natural Resources teachers (Table 6).

Insert Table 6 about here

CONCLUSIONS AND/OR RECOMMENDATIONS

It was concluded that agriculture teachers in the six taxonomies were slightly to somewhat satisfied with each of the five job satisfier factors. However, teachers were undecided about their job satisfaction when all facets of their jobs were considered. It is recommended that agriculture teachers use the questionnaire utilized in this study to assess their own level of job satisfaction and compare their level of satisfaction to that of other teachers in their own taxonomy.

Significant differences on the job satisfier factors were found among the six taxonomies of agricultural education teachers. It is recommended that further research be conducted to identify the specific qualitative factors that contribute to the significant differences on job satisfier factors. Identification of the qualitative factors could lead to development of programs aimed at helping teachers become more satisfied with specific facets of their jobs.

Of the thirty correlations calculated to describe the relationship between overall job satisfaction and the job satisfier factors, only one was consistent with the Motivator Hygiene theory proposed by Herzberg et. al. (1959). It was, therefore, concluded that the job satisfier factors measured by Wood's (1973) instrument are not useful predictors of the overall job satisfaction of agricultural education teachers.

Agricultural Mechanics teachers were significantly older than Horticulture teachers and Production Agriculture teachers, had significantly fewer years of teaching experience than Agricultural Business teachers, and were more likely to possess only a high school diploma. Agricultural Mechanics teachers had the lowest mean score on the overall job satisfaction scale and scored significantly lower on achievement than FBPA teachers. A possible explanation for the differences may be that many Agricultural Mechanics teachers were recruited from industry and did not participate in a four year teacher preparation program. Further research is needed to determine if the way in which agriculture teachers are recruited and trained contributes to their overall job satisfaction.

Table 1

Means, Standard Deviations, and F-Ratios for Selected Demographic Variables of Agricultural Education Teachers (n = 313).

	Ag. Business (n=27)		Ag. Mechanics (n=55)		FBPA (n=16)		Horticulture (n=64)		N. Resources (n=15)		Production Ag. (n=146)			
Variable	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	F	p
Age	42.04	8.13	44.85	11.01	44.06	15.31	38.02	7.62	38.33	7.76	37.37	7.91	7.26	.001[a]
Total years teaching	15.89	7.03	10.76	6.17	15.81	11.11	12.63	6.71	12.00	6.00	13.2	37.57	2.48	.032[b]
Years in current position	10.52	6.67	8.85	5.95	6.88	4.54	10.64	6.59	9.93	6.56	10.22	7.18	1.19	.313

[a] Agricultural Mechanics teachers were significantly older than Production Agriculture teachers and Horticulture teachers.

[b] Agricultural Business teachers had significantly more years of teaching experience than Agricultural Mechanics teachers.

Table 2

Relationship Between Taxonomy and Degree Status for Agricultural Education Teachers (n = 313).

	Ag. Business		Ag. Mechanics		FBPA		Horticulture		N. Resources		Production Ag.		All Cases	
Degree Status	f	%	f	%	f	%	f	%	f	%	f	%	f	%
High school diploma	3	11.1	32	64.0	2	13.3	8	12.9	0	0.0	2	1.4	47	15.0
Bachelor's degree	8	29.6	13	26.0	6	40.0	25	40.3	6	40.0	82	56.9	140	44.7
Master's degree	16	59.3	5	10.0	7	46.7	29	46.8	9	60.0	60	41.7	126	40.3

Cramer's V = .45

Chi-Square (10 df) = 127.09 $p < .05$

Table 3

Relationship Between Taxonomy and Tenure Status for Agricultural Education Teachers (n = 313).

Tenure Status	Ag. Business f	 %	Ag. Mechanics f	 %	FBPA f	 %	Horticulture f	 %	N. Resources f	 %	Production Ag. f	 %	All Cases f	 %
Yes	16	59.3	20	40.0	3	20.0	34	58.8	7	46.7	60	41.7	140	44.7
No	11	40.7	30	60.0	12	80.0	28	45.2	8	53.3	84	58.3	173	55.3

Cramer's V = .18

Table 4

Means, Standard Deviations, and F-Ratios for Overall Job Satisfaction of Agricultural Education Teachers (n = 313).

Variable	Ag. Business (n=24) Mean	 S.D.	Ag. Mechanics (n=53) Mean	 S.D.	FBPA (n=15) Mean	 S.D.	Horticulture (n=63) Mean	 S.D.	N. Resources (n=15) Mean	 S.D.	Production Ag. (n=137) Mean	 S.D.	F	p
Overall job satisfaction	2.78	.18	2.75	.23	2.86	.21	2.78	.12	2.83	.12	2.82	.20	1.45	.206

Note. Based on scale: 1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree.

Table 5
Means, Standard Deviations, and F-Ratios for Job Satisfier Factors of Agricultural Education Teachers (n = 313).

	Ag. Business (n=27)		Ag. Mechanics (n=55)		FBPA (n=15)		Horticulture (n=62)		N. Resources (n=15)		Production Ag. (n=143)			
Variable	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	F	p
Achievement	4.58	.74	4.38	.81	5.06	.38	4.30	.73	4.44	.87	4.53	.66	3.18	.008[a]
Advancement	4.19	1.01	4.14	.84	4.70	.95	4.02	.92	4.00	1.10	4.27	.82	1.90	.094
Recognition	4.17	1.11	4.37	.94	4.73	.94	4.21	1.06	4.78	1.44	4.71	.97	1.04	.394
Responsibility	4.53	.78	4.65	.93	5.19	.64	4.60	.82	4.78	1.11	4.71	.80	1.55	.173
Work Itself	4.59	.71	4.61	.97	5.29	.83	4.59	1.00	4.98	.88	4.58	.78	2.52	029[b]

[a] FBPA teachers scored significantly greater than Horticulture teachers and Ag. Mechanics teachers on achievement.
[b] FBPA teachers scored significantly greater than Horticulture teachers and Production Ag. teachers on the work itself.
Note. Based on scale: 1 = very dissatisfied; 2 = somewhat dissatisfied; 3 = slightly dissatisfied; 4 = slightly satisfied; 5 = somewhat satisfied; 6 = very satisfied.

Table 6
Relationship Between Overall Job Satisfaction and Job Satisfier Factors of Agricultural Education Teachers (n = 313).

	Ag. Business (n=24)	Ag. Mechanics (n=40)	FBPA (n=12)	Horticulture (n=50)	N. Resources (n=13)	Production Ag. (n=99)
Achievement	.26	-.03	.02	.06	-.01	.05
Advancement	.27	-.03	.40	.04	.05	-.01
Recognition	.08	.04	.19	.25	-.62*	.02
Responsibility	.27	-.14	.22	.18	-.17	.04
The Work Itself	.40*	-.16	.32	.18	-.15	.07

* $p < .05$

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MOTIVATOR-HYGIENE THEORY AND THE JOB SATISFACTION OF SIX TAXONOMIES OF AGRICULTURAL EDUCATION TEACHERS

A Critique

Dean Sutphin, Cornell University-Discussant

This study of job satisfaction addresses an important issue in agricultural education. The number of agricultural education teachers has declined in recent years along with the number of students. Moreover, funding cutbacks to education and other forces and factors have increased pressures on the agriculture teacher.

An appropriate theoretical base was selected for the research. The investigation builds on previous research from within agricultural education and there are appropriate linkages to related disciplinary based research. Listing the agricultural education taxonomies and their source in the review of literature would clarify if the taxonomies are specific to Ohio.

The purpose and objectives of the research were clearly stated. However, the purpose statement could be enhanced by including the expected outcome of the study such as enriching the literature or leading to inservice education. Also listing the four demographic variables in the objectives would enhance understanding of the study.

The procedures were explicitly described which is a strength of the study. There was a complete frame, appropriate sample selection and control for non-response error. Instrument validity and reliability were established. An alpha level was established a priori, and appropriate statistical analyses followed.

The findings are clearly written. Professional development needs were unique within taxonomies. For example, agricultural mechanics teachers have significant differences from other types of teachers on several characteristics. All the objectives were sufficiently addressed in the findings, although the objective on the relationship between demographic characteristics could be emphasized.

Conclusions and recommendations provided insight on the significant outcomes. The recommendation that teachers use the questionnaire to assess their own level of job satisfaction and the conclusion that the "job satisfier factors measured by the Wood's instrument are not useful predictors of the overall satisfaction..." deserves more explanation. Do the statements infer some level of contradiction? The recommendation to explore qualitative factors was very appropriate, one that will add depth and richness to this area of research.

This is an excellent study, providing useful indicators that are instructive for the professional growth and development of teachers, along with enriching the conceptual and theoretical base for agricultural education. This line of inquiry should be continued.

BENEFITS AND PROBLEMS OF PART-TIME AGRICULTURAL EMPLOYMENT OF SECONDARY AGRICULTURE TEACHERS ON THEIR PROGRAMS AS PERCEIVED BY HEAD TEACHER EDUCATORS AND HEAD STATE SUPERVISORS

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INTRODUCTION

The importance of secondary agricultural education instructors staying current has been stressed as an essential part of secondary agriculture since its formation. Secondary agriculture teachers must keep up-to-date to stay on the cutting edge of employability in order to effectively teach their students and to maintain a viable program. It is imperative that secondary agriculture teachers have a current working knowledge of the agricultural industry. Blomgren & Juergenson (1972) expressed their concerns about keeping up-to-date by offering this solution. They state:

> As agriculture becomes more sophisticated and expands to related fields, teachers must acquire new and improved technical skills in order to keep abreast of inevitable changes. What better way to learn new skills and improve their competency for teaching, than by actively participating in a work experience program, just as they expect their students to do. (p. 84)

Are there any other ways that a secondary agriculture teacher can improve their knowledge of agriculture? "The question is often asked - does operating a farm make you a better teacher. I say that the answer is yes!" (Smith, 1950, p. 254).

Stephens (1981) feels that:

> having a farm of my own has aided in finding new solutions to farming problems and learning existing practices. Many times you will have the attitude of "will this work for me?" As well as being more observant on the farms of others, I feel that the experiences has had a major impact on my teaching ability. (p. 8)

In an interview done by Graham (1988), Mike Cox also believes that:

> teaching farming and working at farming is a happy combo. I do new things on my own farm. I try to use new methods and new products, so when students ask about them I'll know a little more about how they work. (p. 16, 17)

The philosophy of secondary agriculture education over the years has supported the belief that a student's Supervised Agriculture Experience Program (SAE) should be related to his/her occupational objective. In an article written about Cox, this philosophy is reinforced by him in a similar analogy of a secondary agriculture teacher occupational objective in that teachers should be engaged in an occupation of agriculture. He suggests that his diversified farm is a working lab for his teaching. Both jobs complement his interests. He states that "By farming, not only is he a teacher, but he gets to be a student in his own classes." Teachers who do not stay current with new trends and technologies in agriculture will be doomed to teach only agriculture history. The review of literature yielded very little information that secondary agriculture teachers should not farm.

PURPOSE

The purpose of this study was to identify advantages and disadvantages of part-time employment in farming or agribusiness by agricultural teachers on their programs as perceived by Head State Supervisors and Head Teacher Educators.

OBJECTIVES

The following research objectives were designed to guide the study:

1. To identify benefits of secondary agricultural teachers part-time employment in farming or agribusiness on their programs as perceived by Head State Supervisors and Head Teacher Educators.

2. To identify problems of secondary agricultural teachers part-time employment in farming or agribusiness on their programs as perceived by Head State Supervisors and Head Teacher Educators.

3. To analyze differences of perceptions between Head State Supervisors and Head Teacher Educators.

4. To analyze differences of perceptions between Head State Supervisors and Head Teacher Educators by National Association of Supervisors of Agricultural Education (NASAE) American Association for Agriculture Education (AAAE) region.

5. To analyze differences of selected demographic antecedents of Head State Supervisors and Head Teacher Educators.

METHODOLOGY

The descriptive survey research method was used to conduct this study. The population of the study consisted of Head State Supervisors and Head Teacher Educators of 1862 Land Grant Colleges of the contiguous 48 states. Information was solicited from the population using a two part mail questionnaire. The initial instrument requested that each of the 48 Head State Supervisors and each of the 48 Head Teacher Educators identify the three greatest benefits and the three greatest problems of part-time employment in farming or agribusiness by agricultural education teachers in conducting their agricultural education programs. The second instrument was a compiled listing of the responses from the first mailing. The participants were asked to evaluate each statement using a rating scale. The reliability coefficient of the instrument was .95. Ninety-four percent of the Head State Supervisors and 79% of the Head Teacher Educators responded.

RESULTS

The findings of this study are summarized in the following statements. The 22 Benefits and the 42 Problems were rated on the following scale:

1 - not important
2 - somewhat important
3 - important
4 - very important.

Head Teacher Educators and Head State Supervisors perceived 100% of the benefit statements as being "somewhat important" to "important". Of the 22 benefits identified, six received a mean rating of 2.51 or above, which placed them in the "important category". Five of the top six benefits were directly related to the teachers enhanced knowledge and experience. These were: "allows teacher an opportunity to gain experience in the agricultural industry" (mean 2.81), ranked first, "teacher will stay up-to-date in the field of agriculture" (mean 2.75), ranked second, "the opportunity to develop new knowledge and skills" (mean 2.73), ranked fourth, "work experience could be helpful in teaching new skills" (mean 2.59), ranked fifth, and "more aware of agriculture industry problems" (mean 2.53), ranked sixth.

When responses of Head Teacher Educators and Head State Supervisors were compared only two significant differences were detected by the t-test. State Supervisors rated "Supplement income to allow teachers to stay in profession -- particularly in those programs with less than 12 month employment," significantly higher than did Teacher Educators, 2.41 and 1.95 respectively. State Supervisors also rated the factor "Part-time needs caused by low teacher's salary," significantly higher than did Teacher Educators (2.25 vs 1.89). No significant differences were found when analyzed by NASAE/AAAE regions.

Of the 42 problems identified in the study, 37 received mean ratings of 2.51 or above which placed them in the "important" to "very important" category.

The two items considered by the Head State Supervisors and Head Teacher Educators to be the greatest problems, with mean ratings of 3.53 and 3.47, respectively, were: "lack of time for supervision of students", and "lack of time to devote to FFA activities". These overall mean ratings fell between "very important" and "important" on the rating scale.

Of the greatest problems identified, five of the top 10 were directly related to time. These were: "lack of time for supervision of students" (mean 3.53), ranked first, "lack of time to devote to FFA activities" (mean 3.47), ranked second, "lack of time to attend in-service and professional development activities (mean 3.36), ranked fourth, "time is not always available when greatest need arises" (mean 3.35), ranked fifth, and "can't be in two places at the same time" (mean 3.30) ranked seventh.

Data also indicated that no significant differences were found when comparing Head Teacher Educators and Head State Supervisors.

The problems identified by respondents were categorized according to their NASAE/AAAE region in which they work. Opinions of the four groups differed significantly on eight statements. The Western region rated all eight factors as being more of a problem than did the other regions. Four of the eight problem statements dealt specifically with the community. They were: "inability of being able to keep the public informed as to when the teacher is working for the public employer and when he/she is working for the private employer", "part-time employment demonstrates to the community that teaching is not a full time commitment", "poor community involvement by the teacher; thus, weak community support" and "relationship problems with community members and school officials".

Head State Supervisors and Head Teacher Educators who had been employed part-time while teaching high school rated all but two of the perceived major benefits higher than did those who had not been employed part-time.

Opinions of the two groups were found to differ significantly at the .05 level of confidence with regard to two perceived benefit statements. They were: "greater confidence in teacher on part of students and adult class members" and "apply 'theory' into practice", considered to be significantly greater benefits by those who did have part-time employment while teaching at the secondary level.

Perceived major benefits were analyzed by age, the number of years the respondent had been employed in his/her present position and the number of years which he/she taught high school. Data indicated no significant differences were detected when age, years in present position and years of teaching high school were analyzed by the analysis of variance statistical procedure.

When comparing previous part-time employment by respondents, fifteen statements were considered to be significantly greater problems by Head State Supervisors and Head Teacher Educators who did not have part-time employment while teaching at the secondary level. They were:

Lack of time for supervision of students.

Lack of time to devote to FFA activities.

Lack of time to attend in-service and professional development activities.

Time is not always available when greatest need arises.

The part-time job can become a second full-time job.

Can't be in two places at the same time.

Part-time employment hinders lesson planning.

Administrators continually question if SAE visits are "real" or if the time is being used for the business.

Encourages part-time programs particularly in small or budget stressed schools.

Contributes to a decline in the dedication to teaching.

Lack of time to teach adult education classes.

Concern from school officials about time spent away from official duties.

Develop community image of agricultural teaching as less important than other areas of teaching with full-time instructors.

Tarnishes the image of vocational agriculture teachers as professionals.

Teach only to the content of part-time employment subject matter.

Significant differences were detected on 10 of the 42 problems. It was interesting to note that those respondents who ranged from 31 to 40 perceive the significantly rated problems as lesser problems than do respondents in other age groups. They were:

Conflict of interest -- using vocational agriculture facilities and students to accomplish tasks related to outside employment.

May result in reduced teaching contracts for all agriculture teachers.

Conflict of interest -- employment of vocational agriculture students in vocational agriculture teacher's part-time agribusiness can be viewed as exploitable by some members of community.

> Inability of being able to keep the public informed as to when the teachers is working for the public employer and when working for the private employer.
>
> Emergencies in part-time employment that must be handled regardless of school commitments.
>
> Part-time employment demonstrates to the community that teaching is not a full time commitment.
>
> Can affect relationships with students if product sold or promoted to students causes public relation problems where local producers are concerned.
>
> The public image that the teacher is "double dipping".
>
> Develop community image of agricultural teaching as less important than other areas of teaching with full-time instructors.
>
> Competition with others seeking employment.

Data indicated that as years in present position increases so does the rating for the two factors identified as having significant differences according to analysis of variance statistical procedure. The two were:

> Conflict of interest -- employment of vocational agriculture students in vocational agriculture teacher's part-time agribusiness can be viewed as exploitable by some members of the community.
>
> Can affect relationships with students if product sold or promoted to students causes public relation problems where local producers are concerned.

When data for years in teaching high school were analyzed they showed that the longer respondents taught the more they perceived the factors to be a problem. Those respondents who taught less than 20 years perceived factors as less of a problem than those individuals who taught more than 20 years. However, there were only two factors which were noted as having a significant difference of opinion by the respondents. They were:

> Inability of being able to keep the public informed as to when the teacher is working for the public employer and when working for the private employer.
>
> Competition with others seeking employment.

CONCLUSIONS

1. Head Teacher Educators and Head State Supervisors identify more problems than benefits to part-time employment in farming or agribusiness by agriculture teachers.

2. Head Teacher Educators and head State Supervisors rate the problems associated with part-time employment in farming or agribusiness higher than they did the benefits.

3. Head Teacher Educators and Head State Supervisors perceive the problems of part-time employment in farming or agribusiness to out-weigh the benefits of part-time employment for the secondary agriculture program.

4. Head Teacher Educators and Head State Supervisors perceived that communities are concerned with the quality of the total secondary agriculture program.

5. Community perceptions of the agriculture teacher, whether accurate or not, play a major role in their support for the secondary agriculture program.

IMPLICATIONS

The review of literature along with the findings of this study implies there are some benefits to part-time employment in farming or agribusiness on the secondary agriculture program. The findings of this study also support the unwritten philosophy presently held by Head Teacher Educators and Head State Supervisors across the country that, part-time employment will be a greater problem than benefit to the program. It is not certain based on the data gathered that Head Teacher Educators and Head State Supervisors have an accurate perception of the communities' feelings about secondary agriculture teachers being employed part-time in farming or agribusiness.

RECOMMENDATIONS

Based on the results of this investigation the following recommendations are proposed by the researcher:

1. Head Teacher Educators and Head State Supervisors should communicate to preservice teachers and secondary agriculture teachers the problems and benefits from being engaged in part-time farming or agribusiness.

2. An agriculture teacher who is involved in part-time employment in farming or agribusiness needs to be very careful that he/she does not lose the community's support for his/her program by creating a conflict of interest.

3. If secondary agriculture teachers are going to be engaged in part-time farming or agribusiness, they must make a concerted effort to adequately supervise students' agriculture experience programs and devote time to FFA activities which are beyond school hours.

4. Further research should be conducted to determine the advantages and disadvantages of part-time employment by secondary agriculture teachers outside the field of agriculture on the overall quality of the agriculture program.

5. Further research should be conducted to determine the advantages and disadvantages of part-time employment in farming or agribusiness as perceived by secondary agriculture teachers.

6. Further research should be conducted to determine the advantages and disadvantages of part-time employment in farming or agribusiness as perceived by members of the community and school administration.

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BENEFITS AND PROBLEMS OF PART–TIME AGRICULTURAL EMPLOYMENT OF SECONDARY AGRICULTURE TEACHERS ON THEIR PROGRAMS AS PERCEIVED BY HEAD TEACHER EDUCATORS AND HEAD STATE SUPERVISORS

A Critique

Dean Sutphin, Cornell University–Discussant

This study examined teacher educator's and state supervisors' perceptions about part–time agricultural employment for teacher. The review of literature suggested that, perhaps, teachers may benefit from experience in the agricultural industry as well as high school students benefit from occupational experience. The researchers indicated that the literature base was limited in this area. Thus, this study was appropriately focused at a descriptive, exploratory level.

The purpose statement clearly focused the study, but would be enhanced if the end sought was part of the statement. The objectives lead to a systematic analyses. It is not clear why the term "demographic antecedents" is used instead of the traditional descriptor "characteristics".

Procedures were in two parts. The procedures that were adopted may have served the descriptive exploratory purposes of the research, but need to be clarified.

In part two, a likert–type scale was developed and mailed to respondents. Perhaps because or time or financial constraints, the researchers did not choose to establish validity or reliability a priori. However, a high reliability coefficient did result from the study. Nothing was stated about instrument validity.

The population was included in the survey. Non–response error may have been present, since there was not a followup or another form of comparison of those who did not respond. The purpose of using the T–test on the population needs to be clarified. Given that this test was used, the readers need to know the alpha level for the test for significance.

At the beginning of phase two, ideally, instrument reliability would have been established using a sample not included in the study, such as associate state supervisors and former agricultural education department heads. A panel of experts could have established instrument validity. Procedures to increase the response rate could have been adopted. Again, there may have been constraints that limited these procedures.

Each of the objectives were addressed in the findings. The results would have been more comprehensive and informative if mean scores in table format were included with the list of problems. The list of problems associated with part–time employment generated by the research contribute to the literature and help the profession communicate concerns to teachers. The findings also confirm the reasons for the current unwritten philosophy against part–time employment, while recognizing the merits. The recommendations were cogent and focused. Other recommendations could suggest instrumentation and methodology for future research.

In summary, this exploratory research provides insights into previously unanswered questions. It has practical application in methods of education courses and provides a basis for further research.

AN EXAMINATION OF FACTORS ASSOCIATED WITH JOB SATISFACTION AND DISSATISFACTION OF MALE AND FEMALE AGRICULTURAL EDUCATION TEACHERS

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INTRODUCTION

According to Lawler (1977), work experiences have profound effects on both the individual employee and society as a whole. Furthermore, "the research evidence clearly shows that employees' decisions about whether they will go to work on any given day and whether they will quit are affected by their feelings of job satisfaction" (Lawler, 1977, p. 361).

Between 1970 and 1975, Knight (1978) found that 263 Ohio agriculture teachers left the profession for reasons other than retirement or death. Similarly, Morgan (1988) concluded that approximately 11% of all secondary agriculture teachers left the profession annually for reasons other than death or retirement. Is there is a causal link between leaving the profession and job satisfaction? If one can hypothesize that there is a causal link, then it becomes important that agricultural educators assess the level of job satisfaction among agriculture teachers.

What have agricultural education researchers learned about job satisfaction among teachers of agricultural education? Several researchers (Beavers, Jewell, Malpiedi, 1987; Flowers & Pebble, 1988; Grady, 1985; Newcomb, Betts, & Cano, 1987) have concluded that agriculture teachers are fairly or moderately satisfied with their jobs. Knowing whether or not employees are satisfied, however, does not provide sufficient information for dealing with the consequences of job dissatisfaction (Davis & Newstrom, 1989; Lawler, 1977; Mowday, 1984; Porter & Steers, 1977). Instead, a thorough understanding of factors which lead to job satisfaction and dissatisfaction is required (Davis & Newstrom, 1989; Mowday, 1984; Berns, 1989).

PURPOSE AND OBJECTIVES

The purpose of this study was to investigate specific factors associated with job satisfaction and dissatisfaction of male and female teachers of agriculture. In addition, this study sought to determine the overall job satisfaction of male and female secondary agriculture teachers. The research objectives were to:

1. Describe selected demographic characteristics of secondary agriculture teachers by gender.
2. Describe relationships between secondary agriculture teachers' level of job satisfaction and selected demographic variables by gender.

3. Describe relationships between selected job satisfier factors (achievement, advancement, recognition, responsibility, and the work itself) and the overall job satisfaction of secondary agriculture teachers by gender.
4. Describe the relationship between selected job dissatisfier factors (interpersonal relations, policy and administration, salary, supervision, and working conditions) and the overall job satisfaction of secondary agriculture teachers by gender.

PROCEDURES

The population for this descriptive-correlational study was all secondary teachers of agricultural education in Ohio (N = 558). The sample consisted of a census of female secondary agriculture teachers (N = 45) and male secondary agriculture teachers in the taxonomies of Agricultural Business (N = 29), Farm Business Planning and Analysis (FBPA) (N =27), and Natural Resources (N = 13). A random sample of male secondary teachers of agriculture was drawn from Agricultural Mechanics (N = 81, n = 70), Horticulture (N = 71, n = 60), and Production Agriculture (N = 292, n = 170). Cochran's (1977) formula for a 5% chance of error was used to determine the sample sizes. The total sample consisted of 414 secondary agricultural education teachers.

Wood's (1973) instrument was used to assess the level of job satisfaction among secondary agricultural education teachers. Wood's instrument constituted Part I of the questionnaire and provided the basis for describing teacher perceptions regarding the following factors: achievement, advancement, recognition, responsibility, the work itself, supervision, salary, interpersonal relations, policy and administration, and working conditions.

The Brayfield-Rothe "Job Satisfaction Index", as modified by Warner (1973), was used to measure job satisfaction when all facets of the job were considered. The "Job Satisfaction Index" constituted Part II of the questionnaire. Part III of the questionnaire consisted of demographic variables.

Content and face validity were established by a panel of experts consisting of teacher educators, teachers of agriculture, and graduate students. The instrument was pilot tested with a group of agricultural education teachers not included in the sample. Cronbach's alpha was used to assess the reliability of the questionnaire. The reliability coefficient for Part I of the questionnaire was .89, while the coefficients for the ten subscales of Part I were: achievement, .86; advancement, .89; recognition, .93; responsibility, .88; the work itself, .68; supervision, .96; salary, .94; interpersonal relations, .91; policy and administration, .95; and working conditions, .90. The reliability coefficient for Part II of the questionnaire was .94.

Five days prior to mailing the complete questionnaire package which contained a cover letter, questionnaire, and stamped return envelope, a postcard was sent to those in the sample to announce the forthcoming package. A postcard reminder was sent to non-respondents ten days after mailing the initial package. A second complete package was mailed to respondents seven days after the first follow-up postcard. A final follow-up postcard was sent five days after the mailing of the second complete package. The response rate was 81%. Non-response error was controlled by comparing early to late respondents (Miller & Smith, 1983). No significant differences were found between the early and late respondents.

ANALYSIS OF DATA

All data were analyzed using the Statistical Package for the Social Sciences, Personal Computer version (SPSS/PC+). Appropriate statistical procedures for description and inference were used. The alpha level was set a priori at .05. All correlation coefficients were interpreted utilizing Davis' (1971) descriptors.

RESULTS

Of those responding to the questionnaire, it was found that 89% (299) were male while 11% (37) were female (Table 1). The majority of both male and female agriculture teachers had attained a bachelors or graduate degree. In addition, Table 1 shows that the mean age for female agriculture teachers was 32.35 years while the mean age for male teachers was 40.28 years. Male teachers on the average had 13.47 years of teaching experience while females averaged 7.94 years. With regard to the number of years the respondents had been in their current position, males averaged 10.35 years while females averaged 5.95 years. Male agriculture teachers were significantly older, had significantly more years of teaching experience, and had been in their current positions significantly longer than female teachers (Table 1). Additionally, 53.7% (160) of the male agriculture were tenured while 54.1% (20) of the female agriculture teachers were tenured.

Table 1
Means, Standard Deviations, and t-tests for Selected Demographic Variables

	Males (n=299)		Females (n=37)			
Variable	Mean	S.D.	Mean	S.D.	t	p
Age	40.28	9.28	32.35	6.31	-5.05	.001
Total years teaching	13.47	7.39	7.94	4.27	-4.39	.001
Years in current position	10.35	6.74	5.95	4.06	-3.88	.001

The overall job satisfaction measure was based on a five point Likert type scale with responses ranging from strongly disagree (1) to strongly agree (5). Males provided a mean score of 2.80 with a standard deviation of .20 while females provided a mean score of 2.82 with a standard deviation of .16. Mean job satisfaction scores for male and female agriculture teachers did not differ significantly (Table 2).

Table 2
Means, Standard Deviations, and t-test for Overall Job Satisfaction

Variable	Males (n=282)		Females (n=36)			
	Mean	S.D.	Mean	S.D.	t	p
Overall job satisfaction	2.80	.20	2.82	.16	.61	.543

Note. Based on scale: 1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = Agree; 5 = strongly agree.

Based on a six point Likert type scale with responses ranging from very dissatisfied (1) to very satisfied (6), males provided the following mean scores on the job satisfier and dissatisfier factors: achievement, 4.50; advancement, 4.20; recognition, 4.35; responsibility, 4.70; the work itself, 4.65; interpersonal relationships, 4.91; policy and administration, 4.12; salary, 4.10; supervision/technical, 4.11; working conditions, 4.08 (Table 3). The same Likert type scale yielded the following mean scores for female agriculture teachers: achievement, 4.34; advancement, 4.04; recognition, 4.08; responsibility, 4.59; the work itself, 4.61; interpersonal relationships, 4.78; policy and administration, 3.85; salary, 4.24; supervision/technical, 3.76; working conditions, 4.21. Male and female agriculture teachers did not differ significantly on any of the job satisfier factors (Table 3).

Table 3
Means, Standard Deviations, and t-tests for Job Satisfier and Job Dissatisfier Factors

Variable	Males (n=299)		Females (n=37)			
	Mean	S.D.	Mean	S.D.	t	p
Job Satisfiers						
Achievement	4.50	.73	4.34	.74	-1.26	.213
Advancement	4.20	.88	4.04	.93	-.99	.325
Recognition	4.35	1.02	4.08	1.04	-1.46	.151
Responsibility	4.70	.85	4.59	.76	-.73	.467
The Work Itself	4.65	.87	4.61	.89	-.23	.816
Job Dissatisfier						
Interpersonal relationships	4.91	.67	4.78	.56	-1.17	.245
Policy and administration	4.12	1.06	3.85	1.01	-1.37	.172
Salary	4.10	1.23	4.24	1.21	.68	.494
Supervision/Technical	4.11	1.25	3.76	1.34	-1.48	.147
Working Conditions	4.08	.90	4.21	.81	.83	.407

Note. Based on scale: 1 = very dissatisfied; 2 = somewhat dissatisfied; 3 = slightly dissatisfied; 4 = slightly satisfied; 5 = somewhat satisfied; 6 = very satisfied.

Correlations were calculated to describe the relationships between agriculture teachers' level of job satisfaction and selected demographic variables. The coefficients for males ranged in magnitude from a low of .01 for age and tenure status to a high of .07 for degree status (Table 4). Coefficients for females ranged from a low of -.19 for age to a high of .43 for tenure status (Table 4). The correlation between overall job satisfaction and tenure status was significant for females.

Table 4
Relationship Between Overall Job Satisfaction and Selected Demographic Variables

Variable	Males (n=273)	Females (n=33)
Age	.01	-.19
Years in current position	-.03	-.30
Total years teaching	-.03	-.27
Degree status	.07	.38
Tenure status	.01	.43*

*p < .05

Correlations were calculated to describe the relationships between agriculture teachers' overall level of job satisfaction and job satisfier factors. The coefficients for males ranged from a low of .03 for recognition to a high of .07 for achievement and the work itself (Table 5). Coefficients for females ranged from a low of .05 for achievement and responsibility to a high of .26 for the work itself. None of the job satisfier factors were significantly correlated with overall job satisfaction (Table 5).

Table 5
Relationship Between Overall Job Satisfaction and Job Satisfier Factors

Job Satisfier	Males (n = 263)	Females (n = 35)
Achievement	.07	.05
Advancement	.05	.25
Recognition	.03	.22
Responsibility	.05	.05
The work itself	.07	.26

Correlations were calculated to describe the relationships between agriculture teachers' overall level of job satisfaction and job dissatisfier factors. The coefficients for males ranged from a low of .01 for supervision to a high of .12 for salary (Table 6). The coefficients for females ranged from a low of .14 for supervision to a high of .33 for salary. None of the job dissatisfier factors were significantly correlated with overall job satisfaction (Table 6).

Table 6
Relationship Between Overall Job Satisfaction and Job Dissatisfier Factors

Job Dissatisfiers	Males (n = 234)	Females (n = 32)
Interpersonal relationships	-.02	.21
Policy and administration	.03	.25
Salary	.12	.33
Supervision	.01	.14
Work conditions	.02	.17

CONCLUSION AND/OR RECOMMENDATIONS

Male and female agriculture teachers in Ohio are neither satisfied nor dissatisfied with their jobs, and they do not differ significantly in terms of their overall job satisfaction scores. It is recommended that both male and female teachers of agriculture use the questionnaire utilized in this study for making objective self evaluations and for determining which facets of their jobs are satisfying and dissatisfying. An evaluation of this sort will help agriculture teachers plan professional growth activities which are best suited to their individual or respective needs.

Male agriculture teachers were significantly older, had significantly more years of teaching experience, and had been in their current position significantly longer than female teachers of agriculture. Teacher educators in agriculture should attempt to ascertain whether the causes of the differences in age, years of teaching experience, and years in the current position are related to the overall job satisfaction of agriculture teachers.

The teacher's age, years in current position, total years teaching, and degree status were not significantly related to overall job satisfaction. The findings on age, total years teaching, and degree status are contrary to those of Berns (1989) and Grady (1985). Berns (1989) found that as the age of the teacher increased so did their level of job satisfaction. Grady (1985) found a significant difference between job satisfaction scores of vocational agriculture teachers with varying amounts of teaching experience. As the number of years of teaching experience increased, job satisfaction also increased. Berns (1989) stated that "teachers with a masters degree were significantly more satisfied with their teaching positions than those with a bachelor's degree only" (p. 34). The contrast in findings should warn teacher educators that broad generalizations about job satisfaction are not possible among agriculture teachers. Therefore, the findings of this study only hold true for male and female agriculture teachers in Ohio.

Correlation coefficients calculated to describe the relationship between overall job satisfaction and job satisfier and dissatisfier factors ranged from -.02 to .33, indicating relationships of negligible to moderate magnitude. None of the relationships between job satisfaction and job satisfier factors and dissatisfier factors were statistically significant. It is, therefore, recommended that the job satisfier and job dissatisfier factors as measured by Wood's (1973) instrument not be primarily used to predict the job satisfaction of male and female agriculture teachers. Wood's (1973) instrument provides an excellent assessment of how satisfied teachers are with specific aspects of their jobs, however, an instrument such as the Brayfield-Rothe "Job Satisfaction Index" is needed to assess job satisfaction when all facets of the job are considered.

With respect to the job satisfier and dissatisfier factors, both male and female agriculture teachers rated interpersonal relationships highest. Males rated working conditions lowest while females rated supervision lowest. It is recommended that continued efforts be made to support the development of interpersonal relationships among teachers of agriculture. Furthermore, state supervisors, public school supervisors, and teacher educators should be alerted that female agriculture teachers are least satisfied with supervision. Persons with supervisory duties should review their procedures and methods of supervision to determine if the process is biased against females.

A further recommendation from this study regards surveying teachers who have already left the profession. Did the teachers leave the profession due to job dissatisfaction? It is not unreasonable to suggest that teachers who leave the profession are less satisfied than those who do not leave. Therefore, a longitudinal study should be conducted after five years to determine if those who have left the profession were less satisfied at the time of the current investigation. Also, teachers who have left the profession could be interviewed to determine what influenced them most in their decision to leave.

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AN EXAMINATION OF FACTORS ASSOCIATED WITH JOB SATISFACTION AND DISSATISFACTION OF MALE AND FEMALE AGRICULTURAL EDUCATION TEACHERS

A Critique

Dean Sutphin, Cornell University–Discussant

This study sought to advance the research base on gender differences with respect to job satisfaction and dissatisfaction in agricultural education. This is important in agricultural education because of the limited number of females in the profession. Obviously, this paper is a associated with the research by Cano and Miller on motivator–hygiene theory and job satisfaction in the six taxonomy areas of agricultural education. The researchers are commended for dividing the study into sections that allow them to coherently describe their findings within the time and length of paper constraints of this research conference.

A sound theoretical base was established in the review of literature. If the paper is presented in other forums that provide more opportunity for discussion, The authors are encouraged to bridge gender issue to other areas of vocational education and, perhaps, other areas of the teaching profession. This would help place gender issues in agricultural education in perspective with other areas of teaching.

The purpose and objectives of the research were clearly stated. However, the significance of the research could have been emphasized by the authors including the end sought as part of the purpose statement.

Procedures were appropriate and clearly stated. The frame, sample selection and control for non–response error were appropriate. The researchers are commended for developing instrument reliability for subscales. And, instrument validity was established. An appropriate alpha level was established a priori. The statistical procedures were correctly applied.

All the objectives were sufficiently addressed in the findings. The findings clearly point to a problem in the agricultural education profession, only 11% females. The good news is that the average ages of females are younger than their male counter parts. Retaining females in the profession, and recruiting more, is a professional challenge. The strategies to accomplish this objectives could be a focus of further research.

Conclusions and recommendations bring the significant outcomes into focus. Comparing the findings in this study to other studies was a useful technique. The researchers concluded that there is uniqueness among states that may have led to differences between their study and others. There may also be a relationship to the economic, political and sociological factors of the time period. Another conclusion states that methods of supervision may be biased against females. Further explanations of the satisfier and dissatisfier factors will require a more indepth investigation, probably one with a qualitative component. The researchers, have stayed within the parameters of their study in the conclusions and recommendations. Yet, they pose unanswered questions to explore in further research and suggest a time line for a longitudinal study.

This is an excellent study and line of inquiry that should be continued.

CHARACTERISTICS OF LITERATURE CITED IN THE *JOURNAL OF AGRICULTURAL EDUCATION*: AN EMPIRICAL STUDY

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INTRODUCTION

Thirty-one volumes of the *Journal of Agricultural Education* (formerly *AATEA Journal*) have been published since 1961. Over the years, the journal has undergone a number of changes in terms of size, format, content, frequency of publishing (from three issues to four in 1983) and finally, a change in the name from AATEA Journal to the *Journal of Agricultural Education*.

During the *Journal's* span of 31 years, a number of researchers have examined various research and publishing aspects in the agricultural education profession. The most prominent subjects discussed included: empirical analysis of the Journal of Agricultural Education during the eighties (Radhakrishna and Jackson, 1992); what topics were cited and who was cited (Moore, 1991); reader opinions of the *JAE* (Newman, 1990 & Williams, 1982); statistical procedures used by agricultural educators in reporting research findings (Bowen, Rollins, Baggett & Miller, 1990; Mannebach, McKenna & Pfau, 1984; and Warmbrod 1986); and agricultural and extension education research published in terms of program area, area of focus, and scope (Crunkilton, 1988).

Researchers in other disciplines have also examined research and publishing aspects within their profession. The most notable publications reviewed included: the *Journal of Consumer Research* (Wind, 1977), the *Journal of Marketing Research* (Goldman, 1979), *Journal of Applied Psychology* (Cox, 1977) and *Home Economics Research Journal* (Goldsmith, 1983). Although the scholars in the agricultural education profession have addressed research and publishing activities in a variety of ways, literature is scarce with studies that analyzed the citation characteristics of agricultural educators. "Citations are a popular indicator of the behavior of scholars because they reflect on author's debt to earlier works, constitute a statement as to which of these works are important, and are a means by which authors anchor their work and relate it to earlier research" (Goldman, 1979, p. 485). In addition, citations may also reflect an author's scope of reading and their scientific interests (Berg, 1971; Broadus, 1967; & Crane, 1972).

A number of researchers in various scientific disciplines have considered citation structure as a good indicator of the nature of scientific activity. In addition, citation structure also characterizes a field of study, defines its boundaries, and explains how a discipline is interrelated with other fields of study (Narin, Carpenter and Berlt, 1972). Prominent among the scholars who have analyzed citation structures within their discipline include Goldman (1979)--*Journal of Marketing Research and Journal of Marketing*, Broadus (1952)--*American Sociological Review*, Hamelman, Edward & Mazze (1972)--*Finance Journals*, and Goldsmith (1983)--*Home Economics Research Journal*. These studies have concluded that scientists use various methods to disseminate their research findings. Journals and books were the most widely used methods for communicating research findings, followed by working papers, presentations at research meetings and conference proceedings.

Findings from these studies also indicated that publications such as *Journal of Marketing Research* and *Journal of Marketing*, *American Sociological Review* and *Finance Journals* have a greater degree of self-identity than that of *Home Economics Research Journal*. A discipline is considered to have strong self-identity and compactness if a large proportion of the citations are concentrated in journals related to that area or field of study (Goldman, 1979). For example, Goldman (1979) reported that 41.5% of all citations in the marketing discipline were concentrated in two journals, ie, *Journal of Marketing Research* and *Journal of Marketing* whereas, only 16% of the citations in the home economics discipline were from its two major journals, *Home Economics Research Journal* and *Journal of Home Economics*.

OBJECTIVES

In this paper, the researchers have attempted to examine the nature of sources cited (citation analysis) by the authors of articles published in five volumes of the *JAE* during the decade 1980-90. The objectives of the study were:

1. To determine the citation structure of the *JAE* over a 10 year period.
2. To determine the relative importance of types of citations referenced by authors publishing articles in the *JAE*.
3. To determine the structure of the agricultural and extension education discipline as indicated by self-identity and compactness.

PROCEDURES

A census of all articles published in the *Journal of Agricultural Education (JAE)* during the decade 1980-90 was considered for this study. Then, using a systematic sampling procedure, every 2nd year in the decade was selected for analysis. This resulted in the selection of the years: 1982, 1984, 1986, 1988, and 1990.

A total of 19 issues and 162 articles were analyzed to accomplish the study objectives. The selection of this decade and years for analysis was based on three criteria. First, the journal changed its publication from three to four issues per year, thus becoming a quarterly. Second, a scientific journal reflects the tastes and preferences of the editor, and the reviewers, as well as editorial policies. The *JAE* had three editors during this decade: John Hillison (1982-84), Kirby Barrick (1985-1988), Philip Buriak (1989-1991). And third, the *Journal* changed its name from *Journal of AATEA* to *Journal of Agricultural Education (JAE)* in 1988.

For categorizing citations, the classification of citations by Goldsmith (1983) was consulted. Goldsmith's classification includes: books, journal articles, doctoral dissertations/master's theses, conference proceedings and paper presentations, magazines, and bulletins and reports. Goldsmith's classification of citations was slightly modified to reflect our study needs. For example, dissertation abstracts were included in the dissertation and master's theses category. Staff studies, summary research reports, and ERIC documentation abstracts were included in the bulletin/reports category. The total number of citations per article, per issue, and per year were also determined. In addition, it was also determined how many citations were from the following types of publications: books, journal articles, doctoral dissertation and master's theses, paper presentations and conference proceedings, bulletins and reports. Frequencies, percentages and means were used to describe the data.

RESULTS

Research Question # 1

Scientists use a variety of methods to communicate their research findings. Thus, an attempt was made in this study to examine what sources agricultural educators are reading and using in their research. Data suggests that the mean number of articles cited has increased over the decade indicating a greater breadth of knowledge and reading among agricultural educators. Similarly, the number of articles published and the number of citations used has also increased over the years. During the sample years, the number of citations ranged from 4.52 per article in 1982 to 11.2 in 1990, with an overall mean of 9.2. Furthermcre, it appears that agricultural educators tend to refer fewer citations per article (9.2) as compared to home economists (16.9) (Goldsmith, 1983).

Table 1
Average Number and Distribution of Articles and Citations by Year and Total (1980-90)

	YEAR					
	1982	1984	1986	1988	1990	Total
Number of Articles	19	33	35	30	45	162
Number of Citations	86	224	314	332	506	1462
Average Number of Citations Per Article	4.52	6.79	8.97	11.06	11.24	9.02

Research Question #2 & 3

Agricultural educators are most likely to quote information from journals (26%), followed by books (24%), bulletins and reports (23%), dissertation and theses (13%), magazines and conference proceedings (8.3%). The use of journals has increased over the years. Similarly, the use of books, bulletins/reports, dissertations/theses and conference proceedings has increased. However, the findings indicate a decline in the use of magazines by agricultural educators.

Table 2
Number and Percentage Distribution of Citations by Type, Year and Total (1980-90)

	YEAR						
Citation Type	1982	1984	1986	1988	1990	Total	Percent
Journals	18	41	69	87	162	377	26.0
Books	13	57	94	73	119	356	24.0
Bulletins/Reports	28	57	59	79	112	335	22.9
Dissertation/Theses	23	39	33	38	54	187	13.0
Magazines	1	24	46	32	19	122	8.3
Papers/Proceedings	3	6	13	23	40	85	5.8

Since more than 25% of the sources cited by agricultural educators are from journals, it is important to know what journals are being used by agricultural educators. The *Journal of Agricultural Education* (22.5%) is the most often cited, followed by *Educational and Psychological Measurement* (5.4%), and *Journal of Extension* (5.3%). Findings also indicate that agricultural educators often cite journals from other disciplines, which indicates the interdisciplinary nature and diversity of the profession's research and reading characteristics.

The journals used by scholars and the nature of citation distribution are two key factors that determine the structural aspects of a discipline. Further, if a discipline has a strong self-identity, the researchers in that discipline build on each other's work. According to Crane (1972), extensive cross-referencing by authors in the same area indicates internal bonds, which reflects the structure and identity of a discipline. Similarly, if publications in a discipline are easy to locate because they only appear in a few journals, the discipline can be considered "compact." Greater compactness contributes to a stronger internal structure and self-identity in a discipline (Goldman, 1979, p. 489).

Table 3
Number, Percentage and Rank Ordering of 10 Most Cited Journals by Year and Total

	YEAR						
Journal	1982	1984	1986	1988	1990	Total	Percent/Rank
J. of Agricultural Education	3	13	13	22	34	85	22.5/1
Educational & Psychological Measurement	1	2	2	3	12	20	5.4/2
J. of Extension	3	-	2	8	6	19	5.3/3
J. of Teacher Education	-	1	3	3	8	15	3.9/4
J. of Applied Psychology	-	2	5	1	2	10	2.6/5
J. of Vocational Education Research	-	1	-	3	6	10	2.6/5
American Vocational Journal	-	1	4	-	3	8	2.1/6
NACTA Journal	1	2	-	1	3	7	1.8/7
Administrative Science Quarterly	-	4	3	-	-	7	1.8/7
Educational Researcher	-	-	1	2	3	6	1.6/8
Adult Education	-	4	-	2	-	6	1.6/8
Other Journals	10	11	36	42	85	184	48.8

The discipline appears to have a strong self-identity, which suggests that agricultural educators tend to build on each other's work. In addition, the agricultural education discipline is compact because most of the listed citations are concentrated in three specific journals, the *Journal of Agricultural Education, Journal of Extension* and *Educational and Psychological Measurement.*

CONCLUSIONS AND/OR RECOMMENDATIONS

Journal analysis can provide a means of assessing key factors that usually indicate the research and publishing characteristics of a profession. This study attempted to identify the characteristics of literature cited by agricultural educators in the *Journal of Agricultural Education.* Agricultural educators tend to cite journals, followed by books, and reports.

The discipline of agricultural education appears to have a strong self-identity and compactness. This finding suggests that the *Journal* 's editorial and review boards should consider expanding the scope and breadth of the publication. This expansion should involve publishing research studies conducted in "non-traditional" topics that are currently pursued by many agricultural educators. According to Bowen, Radhakrishna, and Jackson (1991), agricultural and extension education faculty have been distributing more of their time to activities that have not traditionally been included in *JAE.* Bowen, et. al. (1991) reported that the respondents to an agricultural and extension education faculty survey indicated that they were devoting more time to extension education (18.8%), administration (27.1%), and international agricultural education (8.6%) activities.

Agricultural education's narrow focus has been previously addressed by scholars, such as Warmbrod (1986), who indicated that despite the fact that agricultural education research has "made great strides" during last two decades, we must concentrate on building a stronger conceptual/theoretical framework. Moore (1989) indicated that the profession must be on a continuous spiral upward and conduct more theory building research. He also suggested that both faculty and graduate students should seriously consider the scope and importance of their research topics before publishing.

On the basis of the data collected in this study, agricultural educators and the *Journal of Agricultural Education* Editorial and Review Board must "branch out" by conducting and publishing research in non-traditional areas of agricultural education. The profession must also examine and cite more research conducted in other disciplines and incorporate those findings, conclusions and recommendations in order to build a stronger framework and continue broadening our focus and breadth of knowledge.

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CHARACTERISTICS OF LITERATURE CITED IN THE JOURNAL OF AGRICULTURAL EDUCATION: AN EMPIRICAL STUDY

A Critique

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This study makes a significant contribution to agricultural education by examining the merits and level of scholarship in our professional journal. The review of literature establishes an appropriate conceptual base and the background for this analysis.

The objectives were clearly stated. A statement of purpose would have sharpened the focus of the investigation and clearly communicated the reason for pursuing this inquiry.

The procedures were systematic. Researcher bias was not a problem inherent to the nature of this inquiry. The process for the historical review was based on previously tested analytical procedures. Although the analytical model had a conceptual base from related literature , it could have been further strengthened by having a panel of experts review the criteria with respect to the *Journal of Agricultural Education*.

The results clearly addressed the objectives. They indicate that the Journal has made progress during the past ten years. The recommendation to expand the scope and breadth of the research, conduct more theory building research and select important research topics presents a challenge to members of the profession. To fulfill this challenge, the Journal Board may need to review the criteria for selecting articles, and then, accept only those articles that meet the criteria. Although the researcher's admonishing that we "must" branch out has merit, the term "should" or a qualifier of what might happen if this does not happen may be more appropriate.

This reflective analysis is valuable to the profession. The researchers could also have recommended replicating the study, or analyzing the Journal from other perspectives, such as methodology. Case studies in highly regarded journals often focus on a few individuals leading to an indepth understanding, not generalizability. Other relevant questions include: What is the level of acceptance in our Journal for qualitative research articles? How acceptable are literature reviews, historical research, and philosophical articles? Are there common themes for research represented in the *Agricultural Education Journal*? How should the profession respond to the challenges issued by this manuscript? What are the implications for further research or action by the profession.

In summary, this research is clearly focused, methodologically sound, and offers a challenge to the profession. The researchers are commended for an excellent study.

A COMPARISON OF COMPUTER MULTIMEDIA INSTRUCTION VERSUS TRADITIONAL INSTRUCTION IN POST-SECONDARY AGRICULTURAL EDUCATION

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INTRODUCTION

The use of microcomputers has increased dramatically in schools across the nation during the past decade. In 1981, there were only 31,000 computers in use in secondary schools. This number grew to over 325,000 by 1983 and has doubled every year since (Johnson, Johnson, & Stanne, 1985). As computer technology grows, educators must continue to seek out and find situations in which the use of computer applications are beneficial.

Newcomb, McCracken, and Warmbrod (1986) stressed that students learn what they practice. By operating computers to solve problems and learn instructional material, students obtain valuable experience that they need to perform optimally in the agricultural work-place. Utilizing computer technology in the classroom also adds diversity to the presentation context. A relatively new dimension of microcomputer technology entitled, "multimedia" possesses the potential to influence student learning and knowledge acquisition. Multimedia is a multi-faceted approach to computer-based education that brings together text, graphics, animation, video, still images, audio, and motion video.

Sensing the vast capabilities of multimedia in the educational realm, computer companies have developed multimedia software packages that can be used as teaching tools by instructors. Multimedia serves as a trenchant teaching tool since it facilitates more complete use of a student's senses in learning. Multimedia instructional material allows the learner to actually see, hear, and use the content learned (Roden, 1991). Because multimedia software and hardware furnishes students with these experiences, it has the potential to be applied in a variety of educational settings. Hooper (1986) cited the need for more research in her report on multimedia in education. She stated, "We need examples that make explicit the wide range of ways that sights and sounds can add to educational experiences, and specific evaluations on how these contribute to the learning process".

Though there is little empirical data in the field of education, one can look at business to see the impact of multimedia. Studies (Roden, 1991; Carlson & Falk, 1989) have shown that superior academic performance was achieved when multimedia forms of instruction were utilized. The Comsell Company found that multimedia students move through the learning experience 30 percent faster than in a traditional classroom (Roden, 1991). A Department of Defense study (cited in Amthor, 1991) also provided favorable findings for multimedia. When interactive video instruction was compared to more traditional methods of instruction, achievement was improved by over 38 percent while the time needed to teach the subject matter decreased by 31 percent.

A continual dilemma experienced by agricultural educators is how to respond to the changing face of society and stay abreast of the possible impacts that technology could have in the teaching-learning context. The potential use of computer multimedia in agricultural education settings is significant. Practical applications inherent to agriculture make computer multimedia a good candidate for applying this technology to the teaching-learning situation. If agricultural educators can adapt and utilize multimedia technology as a new teaching tool, capable of improving students' ability to learn, then all individuals involved in agricultural education will benefit.

Purpose and Objectives

The purpose of this research study was to compare the effectiveness of computer multimedia that incorporated text, graphics, and still pictures as an instructional technique to a traditional instruction method. The main objectives for this study were to determine: 1) The affects of two different instructional techniques on academic achievement in the short-term and long-term; 2) students' perceptions of computer multimedia instruction compared to their perceptions of traditional instruction; and 3) the affects of computer multimedia when used as a supplemental study tool.

PROCEDURES

Methodology, Population, and Sample: This study was planned and conducted using a pretest-posttest control group experimental design. Participants in this study were undergraduate students (n=75) at Purdue University enrolled in Agricultural Economics 100 during spring semester, 1992. Agricultural Economics 100 is the introductory agricultural economics course. Students were randomly assigned to one of three experimental groups: 1) multimedia instruction only, 2) lecture instruction with multimedia as a supplemental learning tool, and 3) lecture only.

Instrumentation: Instruments were developed to measure the dependent variables and to record perception, personal, and situational data. Data was collected using a demographic questionnaire, agricultural economics demand knowledge test, Multimedia Perception Questionnaire, and the Lecture Perception Questionnaire. Reliability coefficients were calculated for the three achievement tests and the perception questionnaires. The achievement test instruments produced reliability coefficients of .63 for the pretest, .66 for the short-term posttest, and .68 for the delayed posttest. Coefficient Alpha of .93 and .49 were computed for the multimedia and lecture perception questionnaires, respectively.

Administration: Prior to the pretest, the students were randomly assigned to a multimedia only group (Group I), a lecture group with multimedia supplementation (Group II), or the lecture control group (Group III) using the students' identification numbers and a table of random numbers. All students took the agricultural economics demand knowledge pretest and completed the demographic questionnaire during the class period preceding the first treatment segment.

All students then received instruction on the selected topic, "Demand Principles". Topics discussed in the instructional lesson included: definition of demand, marginal utility, factors that shift demand, and factors that change quantity demanded. Both the lecture discussion and computer multimedia instructional taught this concepts The experimental group (Group I) did not attend the traditional class on this topic; rather they were asked to work with the computer multimedia instructional packet. The students had up to 50 minutes to work with the multimedia program. Instructional time spent on the demand module for each student was kept both manually and through tracking procedures within the multimedia module. Upon completion of the computer multimedia instructional module, the students filled out a questionnaire to determine their perceptions of the computer multimedia module. The students in Group II attended the traditional lecture with the control group (Group III). The lesson on demand concepts was 50 minutes long and was taught in the regular classroom by the agricultural economics instructor.

One week after the completion of the instructional unit, all students were given the agricultural economics short-term demand knowledge posttest. The students in Group II and III also completed the Lecture Perception Questionnaire at this time. Group II, the traditional group that used multimedia as a supplement learning tool, was then given a set of written instructions and had one week in which to work with the multimedia module in the computer center and complete the Multimedia Perception Questionnaire. The delayed demand knowledge posttest was given to all students 3 weeks following the instructional unit on Demand. The length of this study was 23 days from the initial pretest to the delayed posttest.

ANALYSIS OF DATA

The data collected from this experiment were checked, coded, and entered into data files on the main frame computer. The procedures used to statistically analyze and summarize the data were as follows:

1. The Statistical Package for the Social Sciences (SPSSx) was used to analyze the data.
2. Dependent variable gathering instruments, including the pretest, posttests, and perception questionnaires were analyzed for reliability. Cronbach's Coefficient Alpha was used to estimate the reliability for this analysis.
4. Descriptive statistics, analysis of variance, multifactor analysis of variance, and inferential statistics were used to determine differences between treatment groups and pretest and posttest scores.
5. Questions on the perception questionnaires designed to elicit negative responses were recoded for data analysis purposes. Thus providing uniform responses for calculation of individual and group means.
6. Descriptive statistics and analysis of variance were used to analyze data on the perception questionnaires.
7. Paired T-test analysis was employed to determine differences between lecture and multimedia perceptions for Group II.

RESULTS

Description of Sample: Due to attrition, the sample size was decreased to 53 students. Available SAT, pretest, and posttest scores of the students dropped from the study were analyzed and were determined not to be significantly different from those in the sample group. For this study, a majority of the student population (62.3%) was white male. No members of the sample group or population were minority students. All students were enrolled in the College of Agriculture. Agricultural Economics and Agricultural Education majors, respectively, made up 42 and 21 percent of the sample group.

Academic Achievement Analysis: Using pretest and SAT scores, the treatment groups were found to be statistically equivalent at the .05 level. Using a 3 treatment by time of measurement repeated measures analysis of variance, test scores were checked for main affects and interactions. Results from this analysis indicated that the three groups did change over time as a time main affect did occur. However, a group by time interaction affect was not found. Therefore, one form of treatment did not have a greater significant affect on the agricultural economics demand knowledge test. A comparison of the Group Demand Knowledge Test scores can be viewed in Table 1. It should be noted that the students using computer multimedia as the only instructional method moved through the instructional unit 32 percent faster. It was also revealed that the group which received multimedia as a supplemental tool did not significantly increase on delayed posttest scores when compared to the scores of the other experimental groups.

Table 1

Pretest, Short-term Posttest, and Delayed Posttest Score Comparison

Score	Group I (s.d.) n=15	Group II (s.d.) n=22	Group III(s.d.) n=16
Pretest	41.73 (17.53)	45.18 (19.89)	43.50 (21.84)
Short-term Posttest	60.13 (16.84)	58.64 (16.99)	58.12 (18.50)
Delayed Posttest	64.27 (18.20)	67.82 (14.42)	61.87 (16.16)
Gain Pre-PT1	18.40	13.46	14.62
Gain Pre-PT2	22.54	22.65	18.37
Gain PT1-PT2	04.14	09.18	03.75

S.D. = Standard Deviation

Student Perceptions of Computer Multimedia: Students in Group I and Group II completed the Multimedia Perception Questionnaire to ascertain their perceptions of the computer multimedia instructional method. This questionnaire consisted of 30 statements that gauged the students' perceptions of multimedia. The questionnaire was divided into subsets to allow for in-depth analysis of the following categories: multimedia as a study tool, multimedia features, computer multimedia as an instructional tool, general computer use, and attitudes towards agricultural economics. The students responded to the statements on a 5 point Likert Scale.

A two treatment one way ANOVA showed that the overall perceptions of students who received computer multimedia instruction as the only form of instruction were not significantly different from those students who used the multimedia module as a supplemental study tool. While the overall perceptions of the two groups who utilized the computer multimedia did not differ; item analysis revealed that they did significantly differ with respect to some of the questions. A complete list of these differences can be viewed in Table 2.

Table 2

Multimedia Perception Differences of Group I and Group II

Question		F-Ratio	F-Prob.
#3-	I would prefer to learn from the computer than a traditional class.	7.6842	.0089**
#8-	If given the choice, I would not want to learn from this type of program.	8.2089	.0070**
#9-	The graphs included in the multimedia program helped me to learn.	5.3864	.0262*
#10-	I would prefer to learn from a computer than read a textbook.	8.2663	.0068**
#14-	The computer multimedia module did not increase my understanding on the concepts of demand.	4.1688	.0488*
#20-	I could learn faster using this program than attending a lecture class.	9.9764	.0033**
#21-	The computer program was not an effective way to teach the concepts of demand.	5.3433	.0268*
#28-	Self-directed computer lessons are more exciting than lecture presentations.	8.8203	.0054**

* Significant at the .05 level
** Significant at the .01 level

In each of the corresponding values in Table 2, the students who used the computer multimedia module as a supplemental tool (Group II) had significantly lower mean values or feelings toward the computer multimedia module. Group II students indicated that they would prefer to learn from the traditional class rather than from a computer multimedia module.

Students in Group II also rated their preference for the use of the computer versus reading a textbook significantly lower when asked question #10. Group I students also rated higher (question #8) when if asked given the choice would they want to learn from this type of program. These students also significantly differed from Group II students when asked to indicate if the graphs in the multimedia module helped them to learn.

When asked about the effectiveness of multimedia instruction, students in Group II cited significantly lower mean ratings than Group I. Question #14 asked the students to indicate if they believed that the computer module helped increase their understanding of demand concepts. Group II students had a lower mean rating as compared to a Group I students. Question #20 asked the students to estimate if they could learn faster using this program rather than attending a lecture class. Students in Group I rated this question higher in comparison to students in Group II.

Question #21 attempted to ascertain whether the students felt that the computer module was an effective way to teach the concepts of demand. Once again students in Group I had a significantly higher mean rating as compared to Group I students. Group I also believed self-directed computer lesson are more exciting than lecture presentations (question #28).

Lecture versus Multimedia Perceptions: Students in Groups II and III were asked to complete the Lecture Perception Questionnaire during the first class period following the instruction unit to ascertain their perceptions of the lecture on demand concepts. The lecture questionnaire consisted of 10 statements that gauged the students perceptions of lecture. Questionnaire items were divided into subsets to allow for in-depth analysis of the following categories: lecture as an instructional tool, lecture as an instructional tool to teach demand, computer use, and attitude towards agricultural economics. The students responded to the statements using a 5 point Likert Scale

A dependent paired T-test showed that the overall perceptions of computer multimedia and lecture instruction for Group II students did not differ significantly. These students did, however, significantly rate learning from lecture higher than from computer multimedia and indicated that they felt that the lecture instructional method was more exciting. These students also indicated that using the computer multimedia did not significantly increase their understanding of the demand concepts.

Qualitative Analysis: Qualitative analysis of the two methods of instruction, showed that the students had favorable responses to both approaches. Students were very positive with respect to the computer multimedia and its value as a study tool. The students, however, issued caution that computer multimedia should never totally replace classroom instruction.

CONCLUSIONS, RECOMMENDATIONS, AND IMPLICATIONS

The findings of this investigation, revealed the comparative effectiveness of computer multimedia to traditional lecture instruction as student achievement was essentially equal when taught using the computer multimedia form of instruction as compared to the traditional lecture strategy.

Furthermore it was found that computer multimedia instruction had no significant affect on student achievement on the agricultural economics demand knowledge test when used as a supplemental study tool. It is the researcher's contention, however, that since the computer multimedia module was strongly patterned after the lecture material, the module proved to be well modeled after the concepts learned in lecture. Student learning time was decreased by 32 percent when learning from the computer multimedia module with no significant effect on student performance on the demand knowledge test.

Students' perceptions were more favorable to the method of instruction they received first. Students learning from multimedia only, preferred this method of instruction whereas the students who received it as a supplemental tool preferred to learn from lecture. Students qualitatively stated that they would like learning from both computer multimedia and traditional lecture situations. It was also stressed that computer multimedia would serve as a valuable supplemental tool to lecture.

Based on these conclusions, the following recommendations were made. Multimedia computer modules should be used by teachers to supplement or replace a portion of traditional classroom instruction, thus allowing the teacher more time to attend to individual needs of students. As this was a base-line study, there is a need for further research to substantiate these findings and to see if the findings are consistent in different agricultural disciplines.

Future studies should also look at the impact of a more sophisticated (i.e., sound, animation, and motion video) computer multimedia module on academic performance and perceptions. The effect of using computer multimedia as a precursor to lecture should also be investigated as well as addressing the impact of computer multimedia at the secondary level-where there may be more variability in academic performance and teaching abilities. Finally, teachers who utilize this technology should strive to identify learning contexts in which computer multimedia applications produce superior academic achievement and positive perceptions.

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A COMPARISON OF COMPUTER MULTIMEDIA INSTRUCTION VERSUS TRADITIONAL INSTRUCTION IN POST-SECONDARY AGRICULTURAL EDUCATION

A Critique

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This is an interesting experimental study of three different teaching methods. It is interesting because it uses a new teaching tool, multimedia, with its graphics, animation and sounds. It is also interesting because it uses an introductory class outside of the agricultural education discipline, Agricultural Economics 100. Cooperation and support from throughout the university system must have been necessary to carry out the logistics of the study.

There were several findings that seemed surprising. There were not any significant differences among the three treatment groups in the scores on the knowledge test. Also, the multimedia instruction method took less time, but the students learned just as much. Another finding was that students preferred the lecture method over the multimedia when it was used as a supplement to the lecture.

Questions:

1. The time main effect might be explained more clearly. Was there a significant gain in scores between the short-term posttest and the delayed posttest? If so, what might be the explanation?
2. Were all three groups compared to ascertain whether their Group Demand Knowledge posttest scores were statistically different? Table 1 seems to be incomplete.
3. Why do the objectives mention comparing two different instructional techniques, when actually there were three: multimedia, lecture with multimedia, and lecture.
4. Why is it stated that students preferred the method they received first when two of the three groups received only one method?
5. Why were multiple t-tests (Table 2) done when this procedure increases the possibility of errors?
6. Could there have been more information on multimedia perception differences of Group 1 and Group II in table form (Table 2) rather than in written form following the table?
7. Why do the authors recommend using multimedia as a supplement to lecture when there was no effect on student achievement? The findings would suggest recommending it as a stand-alone teaching strategy because it saved time and students' reactions were very positive.

This study found that multimedia was an effective teaching tool. The problem may be finding the time, money, and effort required to produce multimedia of the quality that must have been used in this study.

EFFECTIVENESS OF CAI VS. TLI IN TEACHING ELECTRICAL WIRING SKILLS

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INTRODUCTION

A fundamental concern of agricultural mechanization education is innovation within the teaching process. In dealing with high technology, increasing subject complexity, and rising costs, educators (including plant managers and training personnel) must look to alternative methods of training and teaching. Strickland, Poe, Gaultney (1985).

Computer-assisted instruction (CAI) can be an effective and progressive educational tool if implemented into a well-developed course designed around sound learning objectives. The development of a good CAI program requires greater skill and higher expenditures than other teaching mediums, but it enables us to improve our delivery of instruction without a corresponding increase in manpower. CAI, therefore, can lead to an overall gain in productivity in an endeavor whose "productivity" has remained essentially unchanged during the last 50 years. Strickland et al. (1985).

Alemparte, Chheda, Seeley and Walker (1975) pointed out that animation and simulation can be useful in skill-enhancing and communication, and provide a better understanding of the behavior or complex systems compared to more traditional presentation forms. Alemparte et al. (1975) suggested that visual-aids and interactivity in simulations greatly increased the probability that the user would correctly define the system to be simulated.

CAI simulations use the capabilities of computers to their fullest. A significant increase in simulation using CAI is predicted in the future because of the potential value in the learning situation. Chambers, Sprecher (1983).

PURPOSE AND OBJECTIVES

The purpose of this study was to investigate the effectiveness of a computer-assisted instructional (CAI) simulation program vs. traditional laboratory instructor (TLI) assisted exercises in teaching hands-on electrical wiring techniques to high school students in agriculture and college students in the School of Agriculture. The specific objective of this study was to:

1. Compare the effectiveness of CAI vs. traditional laboratory instruction in teaching hands-on wiring skills.

METHODOLOGY

In order to investigate the effectiveness of a computer-assisted instructional simulation program vs. traditional instructor assisted laboratory exercises in electrical wiring techniques, a cross-over experimental design was determined to be the most effective to counteract some of the typical confounding factors that exist in many of the current studies cited by Clark (1985).

A cross-over design is useful when the experimental units possess variable personal skills; likes and dislikes of the subjects cause confounding, or there is a treatment preferential effect. In a cross-over design experiment, 171 students were selected at random from 12 high school classes and 3 college classes. The students were given a pretest to determine knowledge of the subject matter. One-fourth of the students were given simple tasks on the computer, one-fourth complex tasks on the computer, one-fourth simple tasks on traditional wiring boards, and one-fourth complex tasks on the traditional wiring boards. Upon completion of the first task, the students "crossed over" and completed a second task, thus if a student performed a simple task on the computer the student would then complete a complex task on the traditional wiring board.

This method of experimentation allows each student to be part of the control group and part of the experimental group. Table 1 shows the tasks completed during instruction. The tasks were designed to be equivalent regardless of instructional media (computer or wiring board).

Table 1
Complex and Simple Tasks

Complex tasks	Simple tasks
2 porcelain light fixtures	1 single pole switch
Wire equivalence exercise	1 duplex receptacle
2-3 way switches	1 ground fault circuit interrupter
1-4 way switch	3 service entrance panel construction

RESULTS

The determination of the effectiveness of the computer assisted instruction involved several procedures: comparisons of pretest-posttest scores, raw point difference between pretest and posttest scores, and a correlation of the scores with the type of instruction used on the subject. Table 2 represents data from a high school agriculture class, and shows the scores from class 1.

Table 2
High School Class 1

	Computer	Pretest Score		Posttest Score		CAI vs. TLI
Observation	Operation	%Simple	%Complex	%Simple	%Complex	Percentage Increase
1	Complex	70%	30%	70%	73%	43% vs. 0%
2	Simple	25%	7%	95%	46%	70% vs. 38%
3	Complex	25%	7%	80%	77%	69% vs. 62%
4	Complex	0%	0%	66%	77%	77% vs. 66%
5	Simple	0%	0%	80%	38%	80% vs. 38%
6	Simple	0%	23%	58%	23%	58% vs. 0%
7	Complex	75%	34%	91%	100%	65% vs. 16%
8	Simple	50%	11%	91%	38%	41% vs. 26%
9	Simple	16%	7%	95%	53%	80% vs. 46%
10	Simple	41%	23%	100%	26%	58% vs. 3%

The posttest score essentially reflects retention of the mastery process. Although the posttest score and mastery concept have no adjustment for pretest scores, current grading practices reflect a test percentage score and letter grade correlation rather than a net point increase in test scores (posttest-pretest) as a basis for a letter grade. Consequently, the assumption can be made that the computer assisted instruction was more effective for this class than traditional laboratory instruction for both the simple and complex tasks. The mastery scores are shown in Table 3.

Table 3
Posttest Mastery - Class 1

	CAI	TLI
Simple Tasks	88%	80%
Complex Tasks	82%	40%

This type of analysis although interesting, does not give a true understanding of which teaching technique, CAI or TLI, is responsible for effecting the largest positive change in understanding of the instructional material. The major problem associated with the use of the net point change (posttest - pretest), as the basis for determination of increased learning, is the occurrence of high pretest scores and the limitations imposed by students scoring 100% on the posttest.

The standard deviation for the difference between the posttest and pretest scores, regardless of teaching method, was 5.87; using this as the basis, any student score that fluctuated more than one standard deviation between the two teaching methods is noted.

Those observations falling within a standard deviation are reported as showing no effect due to instructional method. In Class 1 (Table 2), the CAI treatment showed a greater change in seven students, while three showed no difference in treatment preference. These results are representative of the 171 subjects and 15 classes studied.

Among problems associated with the methods of analysis utilized thus far, were high pretest sensitivity and possible point increase (posttest - pretest) limitations imposed by students scoring 100 percent on the final exam. One method useful in overcoming these limitations is the analysis of the percentage possible increase (posttest - pretest divided by points possible) in student scores.

The possible percentage score for the simple tasks for all subjects was 0.71 with CAI, whereas the possible percentage score for TLI was 0.40. A similar effect for the complex tasks was examined. The possible percentage score for CAI is 0.62, while TLI showed a score of 0.33.

The posttest means of the TLI and CAI were tested using a t-test. Let μ_1 = TLI population posttest mean, μ_2 = CAI population posttest mean, Y = TLI sample posttest mean, and Z = CAI sample posttest mean, then

alternatives: $H_0 : \mu_1 = \mu_2$ decision rule: If $-A \leq Y - Z \leq A$, conclude H_0
$H_1 : \mu_1 \neq \mu_2$ Otherwise conclude H_1

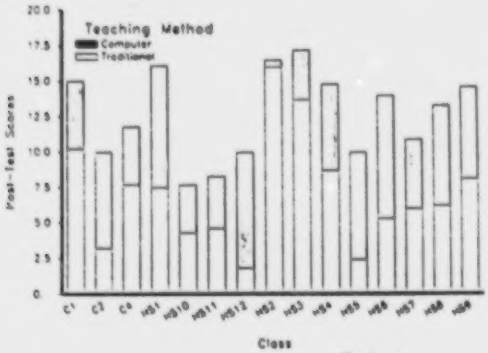
where: $A = t(1-\alpha/2;\ \eta_1 + \eta_2 - 2)\ s(Y - Z)$ $t(0.975;340) = 1.96$
$A = (1.96)(0.751) = 1.47$ $Y - Z = 15.33 - 19 = -3.62$

Since $A = \pm 1.47$ and $Y - Z = -3.62$, conclude H_1 that the means of the TLI and CAI posttest scores were significantly different.

CONCLUSIONS

The composite effect of the possible percentage score showed that CAI was almost twice as effective as TLI in assisting students in realizing their educational potential. Figure 1 is a plot of the posttest scores; it gives a visual representation of the percentage of scores completed on the simple and complex tasks, with the symbol plotted representing the instructional method.

Figure 1
Plot of Posttest Scores



IMPORTANCE OF THIS STUDY

Computer-assisted instruction as shown in this study is an effective and progressive educational tool when implemented into a well developed course designed around sound learning objectives. The development of a good CAI program enables us to improve our delivery of instruction without a corresponding increase in manpower.

Since it has been shown that students can learn hands-on skills more effectively utilizing computer assisted instruction, it is reasonable to expect that more high quality graphics programs will be available in the future to help teach difficult skills that previously required an expert instructor or expensive equipment. This will allow a curriculum to be based on student needs, rather than the comfort zone of the instructors experience.

CAI is not meant to replace teachers, but can serve to augment the instructional process, allowing remediation, individual tracking, and supplemental instruction that can benefit the student and the instructor.

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EFFECTIVENESS OF CAI VS. TLI IN TEACHING ELECTRICAL WIRING SKILLS

A Critique

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Even though computers have been in the classroom for a decade or more, computer-assisted instruction still fits the definition of an innovative teaching technique worthy of study. Poe and Strickland's paper underscores the need for computer competency by agricultural educators. The authors compared computer-assisted instruction to traditional laboratory instruction and found that CAI was almost twice as effective as TLI when teaching hands-on wiring skills to high school and college students.

The study uses a cross-over experimental design. The design is explained and a rationale is provided, but no explanation is given of the origin of the design or of other researchers who may have used it in similar circumstances.

There was only one objective and it was the same as the purpose. Why were objectives about the specific aspects of the study not stated?

It is unusual to put a figure in the conclusions; Figure 1 seemed to belong with Table 3. It could have been discussed in an earlier section and then summarized at the end.

The paper doesn't mention a pilot test of the pretest/posttest. A pilot group would likely have uncovered the difficulty with students scoring 100 percent on the posttest.

Some questions:

1. One of the conclusions, judging from Table 3, might have been that computer-assisted instruction was more effective in complex tasks. Why was this not mentioned?
2. What was the population of the high school group versus the college group?
3. Would the authors recommend that current grading practices be changed to reflect an increase in posttest over pretest scores?
4. Should the competency of the instruction be assessed on the basis of an increase in posttest over pretest scores?
5. Would a simple Chi-square on the posttest mastery percentages have given the same results as the t-test of the posttest means?

The authors are to be commended for an interesting study.

EXAMINING ATTITUDINAL FACTORS RELATED TO AGRICULTURE TEACHERS' PERCEIVED MICROCOMPUTER COMPETENCE

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INTRODUCTION

Agriculture teachers are facing rapid changes in both the knowledge base and technology available to help them work with young people and adults. Cetron and Davies (1989) indicated that the present level of technical knowledge will represent only one percent of the knowledge that will be available in 2050. Advances in technology such as computers, lasers, and robots will open many new avenues for providing and enhancing innovative ways of teaching, including the way teacher educators deliver in-service education.

One way that technology can impact in-service education is through the interactive capability of microcomputers, namely electronic mail and computer conferencing. Norton and Stammen (1990) described computer conferencing as an innovative form of in-service training that addresses many barriers agriculture teachers face when attempts are made to take college courses to further their education. Such barriers include demands of work and family, long commutes to class, and conflicts with time schedules.

Martin & Lundstrom (1988) suggested that attitudes toward educational technology can play an important role in the acceptance of an innovation such as microcomputers. Fishbein and Ajzen (1975) proposed that attitudes are necessary precursors to changing behaviors. This theoretical framework assumes a causal chain linking beliefs, formed on the basis of available information, to the person's attitude; beliefs and attitudes to intentions; and intentions to behaviors. Therefore it is necessary to distinguish among beliefs, attitudes, intentions, and behaviors and consider the relationships among the variables. Fishbein and Ajzen also indicated that "...attitude is viewed as one major determinant of the person's intention to perform the behavior in question" (p.16). Thus, if teacher educators are to use microcomputers for supplementing in-service educational programs, it is important for them to know agriculture teachers' attitude toward this technology prior to its use.

Several studies (Birkenholz & Stewart, 1991; Miller & Kotrlik, 1987; Malpiedi & Blake, 1987; and Raven & Welton, 1989) have examined the use of microcomputers in agricultural education programs. In addition, several other studies (Floyd, 1983; Lichtman, 1979; Martin & Lundstrom, 1988; Pickard, 1983; Taylor & Parrish, 1978; Yeun, 1984, 1985) have focused on microcomputer attitudes of teachers. However, none of these studies examined the *factors* underlying agriculture teachers' attitude toward the use of microcomputers for enhancing in-service programs and how these factors may relate to their perceived microcomputer competence.

PURPOSE AND OBJECTIVES

The purpose of this exploratory study was to identify factors underlying agriculture teachers' attitude toward the use of microcomputers in supplementing in-service activities. The study also sought to determine the amount of variance in agriculture teachers' perceived microcomputer competence that can be explained by the underlying attitude factors. Specifically, the objectives addressed were:

1. To identify factors underlying agriculture teachers' attitudes toward the use of microcomputers for in-service programs.

2. To determine the proportion of variance in agriculture teachers' attitudes toward the use of microcomputers that can be explained by these factors.

3. To determine the amount of variance in agriculture teachers' perceived microcomputer competence explained beyond selected teacher characteristics as determined by the underlying attitude factors.

PROCEDURES

This study was funded by the Ohio Central Region Vocational Education Personnel Development Center. The accessible population for this exploratory study was the agriculture teachers in the Central Region of Ohio (N = 115). A mailing list for the 1990-91 academic year was obtained from the Ohio Department of Education and served as the frame for the study. According to Krejcie and Morgan (1970), a representative sample for a population of 115, within a five percent margin of error, was 94.

The data were collected by a mailed questionnaire adapted from an instrument developed by Yeun (1984). The instrument consisted of three sections. Section I included 18 items designed to determine the level of perceived microcomputer competence using a four-point Likert-type, anchored scale ranging from 1=very competent to 4=not at all competent. Section II included 37 items designed to assess attitude toward microcomputers for in-service programs using a five-point Likert-type scale ranging from 1=strongly agree to 5=strongly disagree. Section III gathered demographic and situational information.

A panel of 12 graduate students and faculty in the department of agricultural education at The Ohio State University were used in refining items and establishing content and face validity. Thirty purposely selected vocational teachers outside the Central Region of Ohio served to establish the reliability of the questionnaire. The resulting Cronbach's Alpha reliability coefficient for internal consistency on Section I was .93 and .87 on Section II.

After two follow-up efforts, useable data were collected from 62 (66%) respondents. Non-response error was controlled by comparing early and late respondents as suggested by Miller and Smith (1983) with late respondents serving as a surrogate for non-respondents. No significant differences were found between the two groups of respondents.

ANALYSIS OF DATA

The data from the questionnaires were analyzed using the SPSS/PC+ statistical package. Descriptive statistics such as percentages, frequency counts, means, and standard deviations were used to describe the agriculture teachers' characteristics. Exploratory factor analysis was used to identify the factors underlying the attitude agriculture teachers have toward the use of microcomputers for in-service programs. Norusis (1988) indicated that factor analysis is used to identify a relatively small number of factors that can be used to represent relationships among sets of many interrelated variables. The evidence on the number of subjects recommended for conducting factor analysis varies from five to ten observations per item (Gorsuch, 1974; Nunnally, 1978; and Arrindell & van der Ende, 1985). Since no studies were identified that specifically examined factors underlying agriculture teachers' attitudes toward using microcomputers for in-service programs, this initial exploratory study was conducted using the accessible sample. Hierarchical multiple regression was used to enter selected individual teacher characteristic and the independent variables of interest (attitudinal factors) into the regression equation with teachers' perceived microcomputer competence as the dependent variable. An alpha level of .05 was set a priori.

RESULTS

The characteristics collected from the agriculture teachers in the study indicated the average age of the agriculture teachers was 40.2 years (SD=9.7) and had taught an average of 14.4 years (SD=8.7). The data on the agriculture teachers also indicated that 53 (85.5%) of the agriculture teachers were male and 9 (14.5%) were female. In addressing the educational level, 5 (8.1%) of the agriculture teachers reported having less than a bachelor's degree, 33 (53.2%) of the agriculture teachers reported having bachelor's degree, and 24 (38.7%) reported having a master's degree.

In determining the underlying attitudinal factors, it was believed that the variance of each measured variable (item) could be decomposed into common and unique portions, therefore, a maximum likelihood (common factors) factor analysis of the data was conducted. It was also assumed that the underlying factors investigated were not orthogonal, thus an oblimin rotation of the factor matrix (Ford, MacCallum, & Tait, 1986 and Norusis, 1988) was conducted to assist in the interpretation of the factors retained from the analysis.

In conducting the preliminary factor analysis, only factors with eigenvalues greater than 1.0 were considered and a scree plot of the eigenvalues was used to identify breaks or discontinuities. The factor extraction procedures resulted in the identification of three factors underlying the attitude agriculture teachers have toward using microcomputer for in-service programs.

Following the factor extraction process, a second maximum likelihood factor model analysis was conducted retaining the three major factors and rotating them in a final solution using an oblimin procedure. An examination of the items in the resulting factor loading pattern matrix was used to understand the nature of the three factors (Table 1). To assist in the interpretation and to reduce subjectivity, only items with factor loadings of .4 or higher were considered for labeling the factors.

The underlying factors were labeled by the researchers as (1) *Educational Value* of microcomputers, (2) *Confidence* in using microcomputers, and (3) *Apprehensions* toward microcomputers. The three factors accounted for approximately 54% of the variance in the agriculture teachers' attitude toward using microcomputers for in-service programs (Table 2).

To identify the degree of orthogonality of the factors, an interfactor correlation was conducted. The interfactor correlations for the oblique rotated factors indicated low positive and negative correlations ranging from .15 to .39. Therefore, these factors were relatively independent in explaining the attitude agriculture teachers have toward using microcomputers for in-service programs. The Cronbach's Alpha reliability coefficients for the three microcomputer sub-scales resulting from the factor analysis were .47 for the *Educational Value* factor, .90 for the *Confidence* factor, and .66 for the *Apprehension* factor.

Table 3 presents summary data for the dependent and independent variables. Categorical/nominal data were coded using the dummy code method. A hierarchical multiple regression analysis was conducted to ascertain the amount of variance in the perceived microcomputer competence of agriculture teachers accounted for by individual characteristics and the three factors (variables of interest) underlying agriculture teachers' attitude toward using microcomputers for in-service programs. In this study agriculture teachers' perceived microcomputer competence served as a proxy for behavior. With a summated score of the 18 likert-type items representing agriculture teachers' perceived microcomputer competence (Competence Score) serving as the dependent variable, the selected individual characteristics (age, years taught, gender, microcomputer ownership, and educational level) were entered as a

Table 1

Rotated Factor Pattern Matrix Loadings Order of the 36* Microcomputer Attitude Items on Oblique Factors (n=62)

Abbreviated Items	Factor Loadings		
	FACTOR I Ed Val[a]	FACTOR II Con[b]	FACTOR III App[c]
Microcomputers add interest	.81		
Microcomputers provide a supplemental approach	.78		
Microcomputers cause more problems	-.76		
Microcomputers improve instructional quality	.74		
Microcomputers should be encouraged	.73		
Microcomputers isolate teachers	-.72		
Microcomputers improve my effectiveness	.70		
Microcomputers should be made available	.60		
Microcomputers are useful instructional tools	.60		
Microcomputers help acquire knowledge	.57	.42	
Teachers should be computer literate	.57		
Microcomputers are flexible instructional tools	.52	.51	
Microcomputers can be used to tutor	.52		
I would not want to use microcomputers	-.52		.48
Microcomputers should be used in agriculture	.50		
Microcomputers are of little value	-.50		
Microcomputers make learning to mechanical	-.50		
I would try alternative instructional methods	.44		
I am knowledgeable about microcomputer programs		.74	
I have personal interest in microcomputers		.70	
I consider myself informed about microcomputers	-.41	.65	-.60
I would send electronic mail		.63	
I enjoy reading about microcomputers		.62	
My job requires me to learn about microcomputers		.59	
I have an interest in enhancing student learning		.56	
I would exchange information with others		.53	-.41
I know how microcomputers affect society		.53	
Teachers should understand microcomputer impact		.47	
Microcomputers frighten me			.78
Microcomputers adversely affect teachers	-.51		.54
Microcomputers are too complicated			.53
Supervisors pressure me to use microcomputers			.52
Microcomputers are too expensive			.51
I do not enjoy microcomputers			.46
Microcomputers require a math background			.43
Peers pressure me to use microcomputers			.42

NOTE. *One item did not load on any of the three factors.
[a]Educational Value [b]Confidence [c]Apprehension

Table 2
Percent of Variance Explained by Factors Influencing Agriculture Teachers' Attitude Toward Using Microcomputers for In-service Programs (n=62)

Factors	Percent of Variance Explained	Cumulative Percent
1. Educational Value of microcomputers	40.1	40.1
2. Confidence in using microcomputers	8.0	48.1
3. Apprehension toward using microcomputers	6.2	54.3

set into the regression equation. Having controlled for the variance in Competence Score accounted for by agriculture teachers' individual characteristics, the three variables of interest (Educational Value, Confidence, and Apprehension) were then entered into the equation one variable at a time to assess the amount of additional variance that could be explained in Competence Score. The order in which the three variables of interest were entered into the hierarchical model equation was determined by the magnitude of the correlation between the each variable and the dependent variable. The entry order was Confidence ($r=.68$), Apprehension ($r=-.30$), and Educational Value ($r=.22$). The hierarchical multiple regression analysis (Table 4) resulted in 51% of the variance in agriculture teachers' Competence Score accounted for by the linear combination of age, years taught, gender, microcomputer ownership, educational level, and Confidence ($F=7.07$, $p<.05$). Confidence in using microcomputers uniquely accounted for an additional 30% of the variance in agriculture teachers' Competence Score ($t=5.39$, $p<.05$). The two remaining variables, Apprehension and Educational Value, did not account for significant additional variance in agriculture teachers' Competence Score, thus they did not enter the equation and were not reported.

CONCLUSIONS AND RECOMMENDATIONS

Due to the exploratory nature of the study and the small sample size, caution should be exercised in generalizing beyond the respondents. Based on the results of the study, it was concluded that three underlying factors accounted for approximately 54% of the variance in the attitudes these agriculture teachers toward using microcomputers for supplementing in-service education programs. The factors were (1) *Educational Value* of microcomputers, (2) *Confidence* in using microcomputers, (3) and the *Apprehensions* toward microcomputers. Using multiple regression, it was found that by controlling for selected individual characteristics (age, years taught, gender, microcomputer ownership, and educational level), 30% of the variance in agriculture teachers' perceived microcomputer competence was explained by the factor, Confidence.

In planning, designing, and implementing in-service education programs using microcomputers for these agriculture teachers, teacher educators should reinforce the microcomputer confidence agriculture teachers bring to in-service education programs. In-service programs should include time for agriculture teachers to demonstrate their ability in the basic uses of microcomputers. Teacher educators also should demonstrate how these competencies can be use in areas such as computer conferencing and electronic mail.

Further investigation of other factors accounting for additional variance in the attitude of agriculture teachers toward microcomputers needs to be undertaken. Additionally, studies should be conducted to determine how these attitudes contribute to agriculture teachers'

Table 3

Summary Data: Regression of Perception Score of Microcomputer Competence on Selected Variables (n=62)

Variables	Intercorrelations											
	X1	X2	X3	X4	X5	X6	X7	X8	X9	Y1	Mean	S.D.
Individual Characteristics												
Age (X1)	1.00	.28	.36	-.04	.03	.07	.23	-.10	-.24	.02	40.23	9.73
Years Taught (X2)		1.00	.31	.11	.91	.11	.12	.06	-.13	.74	14.36	8.86
Gender[a] (X3)			1.00	.19	-.10	.13	.09	-.14	.02	-.19	--	--
Microcomputer Ownership[b] (X4)				1.00	.17	-.05	-.22	-.37	.17	-.35	--	--
Educational Level												
Master's[c] (X5)					1.00	-.83	-.07	.21	.13	.10	--	--
Bachelor's[d] (X6)						1.00	.19	-.24	-.11	-.19	--	--
Factors												
Educational Value (X7)							1.00	.42	-.38	.22	.04	.98
Confidence (X8)								1.00	-.17	.68	.03	.97
Apprehension (X9)									1.00	-.30	.01	.95
Competence Score (Y1)										1.00	46.10	15.27

[a] 0 = Female; 1 = Male

[b] 0 = No Ownership; 1 = Ownership

[c] 1 = Master's; 0 = Bachelor's; 0 = less than Bachelor's

[d] 0 = Master's; 1 = Bachelor's; 0 = less than Bachelor's

microcomputer behavior and knowledge. Furthermore, research should be undertaken with a larger sample of agriculture teachers to test the stability of the factors identified in this exploratory study.

Table 4

Regression of Agriculture Teachers' Perceived Microcomputer Competence on Selected Characteristics and Confidence (n=62) (Hierarchical Entry)

Variables	R^2	R^2Change	b	t	p
Individual Characteristics	.21	.21			
Age			.07	1.20	.238
Years Taught			.19	.92	.360
Gender[a]			-7.26	-1.45	.155
Microcomputer Ownership[b]			-1.87	-.47	.641
Educational Level					
Master's[c]			-8.53	-1.35	.183
Bachelor's[d]			-8.14	-1.35	.182
Factor					
Confidence	.51	.30	9.94	5.39	.001*
(Constant)			63.25		

*$p<.05$ for individual variables; Standard Error = 11.42; Adjusted R^2 = .44;
For Model: $F = 7.07$, $p<.05$
[a] 0 = Female; 1 = Male
[b] 0 = No Ownership; 1 = Ownership
[c] 1 = Master's; 0 = Bachelor's; 0 = less than Bachelor's
[d] 0 = Master's; 1 = Bachelor's; 0 = less than Bachelor's

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EXAMINING ATTITUDINAL FACTORS RELATED TO AGRICULTURE TEACHERS' PERCEIVED MICROCOMPUTER COMPETENCE

A Critique

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This study used factor analysis to examine teachers' attitudes toward computers and toward the use of computers in inservice education programs.

Because computers have put factor analysis within an easy grasp of researchers, it seems appropriate that factor analysis has been applied to attitudes toward computers themselves, albeit microcomputers. The paper is not clear about how microcomputers would be used for inservice activities. The authors mention the computer as serving in a supplemental role for inservice education. Some further explanation would be helpful. This study apparently was not asking about an inservice on the use of computers but rather on using computers as a communication tool to deliver inservice education. Did the respondents have a clear idea about how this might be done? Has some pilot work, with electronic mail for example, been done using computers for inservice activities? Were the authors thinking that everyone in the Central Region might use a modem to receive inservice training? If so, why wasn't one of the questions about the use of modems?

In a study that may arouse emotional feelings, is it appropriate to have late respondents "serving as a surrogate for nonrespondents?" Although the response rate was acceptable (66%), it might be questioned whether the people who were apprehensive about using microcomputers were equally represented among both the respondents and the nonrespondents.

Why is a four-point scale ranging from 1 = very competent to 4 = not at all competent called a Likert-type? It seems to be simply a numerical scale, not a Likert-type scale. A five-point, strongly agree to strongly disagree, sounds like a Likert scale. What makes it a Likert-type?

The "Educational value" factor has a low reliability coefficient. Should this be listed as a caution in interpreting the results?

It is important in a study of this kind to look beyond the manipulation of data to ask questions about the meaning of the results and their importance to the profession. Recognizing this, the authors have given some helpful suggestions in their recommendations.

A LONGITUDINAL ASSESSMENT OF THE LEARNING AND TEACHING STYLES OF PRESERVICE TEACHERS OF AGRICULTURE: 1990, 1991, 1992

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INTRODUCTION

As individuals, teachers vary in the way they learn and teach. Researchers (Gregorc, 1979; Garger & Guild, 1984) suggest that the learning styles and teaching styles of teachers have implications for student learning. As teacher educators, do we possess knowledge with regard to the learning styles and teaching styles of teachers in the agricultural education profession?

Research has been conducted in several teacher education disciplines with regard to the learning styles (Jensen, 1969; Witkin, 1973; Gregorc, 1979; MacNeil, 1980; Avery, 1985; Jeskey, 1985; Zippert, 1985; Frainer, 1986; Jacobs, 1990;) and teaching styles (Witkin, 1973; Dunn & Dunn, 1979; Gregorc, 1979; Koppleman, 1980; Avery, 1985;) of teachers. Despite the amount of related research regarding learning styles and teaching styles, teacher educators in agriculture may be unable to fully utilize the results because teachers of agriculture were not identified or not included in the previous research. Consequently, there is a lack of data which identifies the learning styles and teaching styles that teachers of agriculture possess.

Learning style describes the manner in which learners sort and process information. Learning style is an important factor in several areas including students' academic achievement, how students learn and teachers teach, and student-teacher interaction (Witkin, 1973). A person's learning style can be categorized as field-dependent or field-independent (Witkin, 1973).

The field-dependence/independence dimension has been the most extensively studied learning style and has produced the broadest applications to educational problems (Witkin, Moore, Goodenough, & Cox, 1977). Research (Witkin, 1973) has shown that a person whose mode of perception is strongly dominated by the surrounding field is said to be leaning toward a field-dependent learning style. Individuals with a field-dependent learning style tend to perceive the world globally, find it more difficult to solve problems (Ronning, McCurdy, & Ballinger, 1984) and teach using a problem-solving approach (Witkin, Moore, Goodenough, & Cox, 1977).

Field-dependent learners are socially oriented and learn best when the subject matter is taught with a social context. Field-dependent learners require externally defined goals and must be provided with organization in the teaching and learning process. As teachers, field-dependent learners are socially orientated with their students by encouraging them to work cooperatively. Field-dependent teachers are very learner-centered, establish a warm and personal learning environment, and generally avoid the use of negative feedback.

A person who perceives items as more or less separate from the surrounding field is leaning more toward a field-independent learning style. Field-independent learners view the world more analytically, find it easier to solve problems (Ronning, McCurdy, Ballinger, 1984) and use an inquiry or problem-solving approach to teaching (Garger & Guild, 1984).

Field-independent learners rely on self-defined goals and self-organization of the subject matter. Teachers with a field-independent learning style are more subject-centered in their instruction and prefer impersonal teaching situations. Field-independent teachers make it clear that they are the authority and are responsible for "guiding", not necessarily "teaching" the students. Field-independent teachers emphasize the importance of individual effort and encourage learning through trial and error.

Research has reported that females learn more toward the field-dependent learning style than their male counterparts (Witkin, Oltman, Raskin, & Karp, 1971). Witkin, Moore, Goodenough, and Cox (1977) reported that people with field-independent learning styles have shown an interest in the teaching of agriculture. Do female preservice teachers of agriculture learn more towards the field-dependent learning style as the previous literature would suggest? Are the learning styles of preservice teachers of agriculture consistent with the previous findings that teachers of agriculture prefer a field-independent learning style?

Is a teacher's teaching style consistent with his/her learning style? Dunn and Dunn (1979, p. 241) asserted that "teachers teach the way they learned" and are supported by other researchers (Witkin, 1973; Gregorc, 1979; Avery, 1985). Yet, Koppleman (1980) and Cano, Garton, and Raven (1991) suggested that insufficient investigations have been conducted on the influence of a teacher's learning style on his/her teaching style.

VanTilburg and Heimlich (Heimlich, 1990) identified an individual's teaching style based on two domains, sensitivity and inclusion. The sensitivity domain is based on the ability of the teacher to 'sense' the shared characteristics of the learners. The inclusion domain is based on the teacher's willingness and ability to utilize techniques to enhance the learning experience based on the groups' characteristics. An individual can be classified into one of four teaching styles based on their sensitivity and inclusion scores. The four teaching styles are: "expert", "provider", "facilitator", and "enabler" (Heimlich, 1990).

Teachers preferring an "expert" style of teaching are subject oriented and seek efficiency in information sharing mainly through lecture. The "provider" teachers are learner-centered and desire effectiveness in teaching. Methods inherent to the "provider" style of teaching include group discussion, demonstration, and guided activities. The "facilitator" teachers are teacher-centered and the method of instruction depends more on the subject content than the learners. The final teaching style is the "enabler." Teachers with the "enabler" style of teaching are very learner-centered in that the learners define both the activity and the process in the learning environment.

Due to the lack of research with regard to the selected teacher characteristics of learning style and teaching style, teacher educators of agriculture do not possess information needed to more effectively educate and supervise teachers of agriculture. If agricultural teacher educators possessed knowledge with regard to learning and teaching styles they would have a better understanding of teachers of agriculture. The direct benefit is that agricultural teacher educators would be in a more desirable position to help individual teachers of agriculture understand themselves and improve their teaching effectiveness to meet the individual learning styles of their students.

PURPOSE AND OBJECTIVES

The purpose of this longitudinal descriptive study was to determine the learning style and teaching style of preservice teachers of agriculture enrolled in a methods of teaching agriculture course for the years 1990, 1991, and 1992. To guide this study, the following research questions were investigated:

1. What was the preferred learning style of preservice teachers of agriculture as measured by the Group Embedded Figures Test for the years 1990, 1991, and 1992?

2. What was the preferred teaching style of preservice teachers of agriculture as measured by the VanTilburg/Heimlich Teaching Style Preference Inventory for the years 1990, 1991, and 1992?

PROCEDURES

The population for this study was preservice teachers of agriculture at The Ohio State University. The sample was preservice teachers enrolled in a methods of teaching agriculture course during the years 1990, 1991, and 1992. The 1990 sample included seven female and 18 male preservice teachers (n=25), the 1991 sample included 15 female and 20 male preservice teachers (n=35), and the 1992 sample included seven female and 15 male preservice teachers (n=22).

The Group Embedded Figures Test (GEFT) (Oltman, Raskin, & Witkin, 1971) was administered to determine the preferred learning style of the subjects as either field-dependent or field-independent. Subjects who score greater than the national mean (11.3) are considered to be field-independent learners while subjects scoring less than the national mean are considered to be field-dependent learners. The GEFT is considered a standardized instrument and has been tested for validity and reliability (Spearman Brown Prophecy formula = .82) (Witkin, Oltman, Raskin, & Karp, 1971).

The VanTilburg/Heimlich Teaching Style Preference (Heimlich, 1990) was used to ascertain the subjects' preferred teaching style. Although the VanTilburg/Heimlich Teaching Style Preference is not considered a standardized instrument, the instrument has been tested for validity and reliability (Cronbach's alpha = .91) (Heimlich, 1990).

ANALYSIS OF DATA

Both instruments were administered during the university academic years 1990, 1991, and 1992. The instruments were administered by one of the researchers during the preservice teachers' enrollment in the methods of teaching agriculture course. All instruments were hand scored by one of the researchers and the aggregate data were analyzed using the SPSS/PC+ microcomputer statistical package.

RESULTS

The results from the 1990 sample indicated that 44% of the preservice teachers preferred the field-dependent learning style and 56% preferred the field-independent learning style (Table 1). In analyzing the 1990 preservice teachers' learning style by gender, males were split equally among field-dependence and field-independence, while 29% of the females were field-dependent and a majority, 71%, were field-independent.

The results from 1991 indicated that 46% of the preservice teachers preferred the field-dependent learning style and 54% preferred the field-independent learning style. A gender analysis revealed that 45% of the males were field-dependent and 55% were field-independent, while 47% of the females were field-dependent and 53% were field-independent.

Thirty two percent of the preservice teachers from the 1992 sample preferred the field-dependent learning style, while 68% preferred the field-independent learning style. Gender analysis revealed that 20% of the males were field-dependent and 80% were field-independent, while 57% of the females preferred a field-dependent learning style and 43% a field-independent learning style.

Table 1
Preferred Learning Styles Of Preservice Teachers Of Agriculture (n=82)

	Field-Dependence		Field-Independence	
	f	%	f	%
1990 (n=25)				
Males	9	50.0	9	50.0
Females	2	28.6	5	71.4
Total	11	44.0	14	56.0
1991 (n=35)				
Males	9	45.0	11	55.0
Females	7	46.7	8	53.3
Total	16	45.7	19	54.3
1992 (n=22)				
Males	3	20.0	12	80.0
Females	4	57.0	3	43.0
Total	7	31.8	15	68.2
All Cases (n=82)				
Males	21	39.6	32	60.4
Females	13	44.8	16	55.2
Total	34	41.5	48	58.5

Combining the samples from 1990, 1991, and 1992 indicated that 42% of the preservice teachers preferred the field-dependent learning style and 58% preferred the field-independent learning style. The mean scores on the GEFT from preservice teachers in 1990 was 11.5 and in 1991 was 11.3, both of which approximate the national norm of 11.3. However, the mean score from the preservice teachers in 1992 was 13.2, which exceeds the national norm of 11.3.

With regard to the preservice teachers' preferred teaching style, combining the results from the 1990, 1991, and 1992 samples indicated that four percent preferred the "expert", 27% the "provider", 15% the "facilitator", and 55% preferred the "enabler" style of teaching (Table 2). Similar results were found when comparing preservice teachers from 1990, 1991, and 1992. Further analysis revealed that males and females did not differ on their preferred teaching styles.

Table 2
Teaching Style Dimensions Of Preservice Teachers Of Agriculture (n=82)

	Expert		Provider		Facilitator		Enabler	
	f	%	f	%	f	%	f	%
1990 (n=25)								
Males	1	5.6	4	22.2	4	22.2	9	50.0
Females	0	0.0	1	14.3	1	14.3	5	71.4
Total	1	4.0	5	20.0	5	20.0	14	56.0
1991 (n=35)								
Males	0	0.0	4	20.0	4	20.0	12	60.0
Females	0	0.0	6	40.0	2	13.3	7	46.7
Total	0	0.0	10	28.6	6	17.1	19	54.3
1992 (n=22)								
Males	1	6.6	5	33.4	1	6.6	8	53.4
Females	1	14.3	2	28.6	0	0.0	4	57.1
Total	2	9.1	7	31.8	1	4.5	12	54.6
All Cases (n=82)								
Males	2	3.8	13	24.5	9	17.0	29	54.7
Females	1	3.4	9	31.0	3	10.3	16	55.3
Total	3	3.7	22	26.8	12	14.6	45	54.9

CONCLUSIONS AND RECOMMENDATIONS

From the data collected, one can conclude that preservice teachers in this study differed in their preferred learning styles as supported by the related literature (Jensen, 1969; Witkin, 1973; Gregorc, 1979; MacNeil, 1980; Avery, 1985; Jeskey, 1985; Zippert, 1985; Frainer, 1986; Jacobs, 1990; Cano, Garton, & Raven, 1991). The data from the three samples supported the related literature (Witkin, Moore, Goodenough, & Cox, 1977) that preservice teachers of agriculture prefer a field-independent learning style. The data further indicated that female preservice teachers tended to prefer a field-independent learning style. The related literature (Witkin, Oltman, Raskin, & Karp, 1971) suggests the opposite to be the case. Why were female preservice teachers of agriculture more field-independent than females in general? Do the results suggest that the agricultural education profession is more attractive to females with a field-independent learning style?

From the teaching style data one can concluded that a majority of the preservice teachers in the samples from 1990, 1991, and 1992 preferred a learner-centered approach to teaching. Additionally, one may conclude that even though the majority of the preservice teachers in the three samples were field-independent learners, the field-independent learners' teaching characteristic of being subject centered was not supported by the teaching style data. Why not? Why did the preservice teachers place a greater value on learner-centered teaching?

Preservice teachers of agriculture in this study differed in their preferred learning styles and preferred way of teaching. The preservice teacher curriculum in agricultural education should include instruction on learning and teaching styles. Preservice teachers of agriculture should be taught how to identify and analyze learning and teaching styles. Preservice teachers of agriculture should have an understanding of how learning and teaching styles influence and effect the teaching and learning process. Additionally, preservice teachers should be taught how to adapt their teaching styles to be inclusive of the various learning styles of students.

Knowing that preservice teachers prefer to learn differently, teacher educators in agriculture must be inclusive of the diversity found within their classrooms and vary their teaching styles to meet the varying needs of preservice teachers. It is recommended that teacher educators in agriculture consider the learning styles of preservice teachers when planning for instruction and determine the most effective instructional approaches and/or strategies for the given learning styles.

Regarding instructional strategies, what is the impact of teachers' learning and teaching styles on their teaching? The agricultural education profession has placed an emphasis on teaching utilizing a problem-solving approach to teaching (American Association for Agricultural Education, 1991). Teacher educators in agriculture need to determine if preservice teachers of agriculture possess the ability to learn and teach using a problem-solving approach. The literature (Ronning, McCurdy, & Ballinger, 1984) stated that field-independent learners find it easier to solve problems and teach using a problem-solving approach (Witkin, Moore, Goodenough, & Cox, 1977). Research needs to be conducted with teachers of agriculture to determine the influence that a person's learning style has on his/her ability to teach using a problem-solving approach to teaching.

Furthermore, teacher educators need to investigate if a pattern can be identified on a larger scale encompassing data from additional states with preservice teachers of agriculture. A study comparing the learning and teaching styles of preservice teachers of agriculture with preservice teachers in other fields of education is needed. With additional research on teaching and learning styles, teacher educators will be in an improved position to educate and supervise preservice teachers of agriculture.

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A LONGITUDINAL ASSESSMENT OF THE LEARNING AND TEACHING STYLES OF PRESERVICE TEACHERS OF AGRICULTURE: 1990, 1991, 1992

A Critique

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Cano and Garton studied over a three-year period both the teaching and the learning styles of students enrolled in an undergraduate agricultural teaching methods course. They used a standardized instrument to classify the students' learning styles as either field-dependent (more socially oriented) or field independent (more subject-matter centered). The students' teaching styles were classified into the categories of Expert, Provider, Facilitator and Enabler.

A strength of the study was that it focussed on a topic of current interest to educators. Evidence of that interest was contained in The Teaching Professor (October, 1992). It reported, "Research on the learning styles of underrepresented groups has gained more visibility as campuses struggle to create climates conducive to the learning needs of all students . . . Even if your mix of teaching styles may not be ideal, it's better than no mix at all." Cano and Garton included in their research report some interesting findings on an underrepresented group in undergraduate agricultural education classes--women. In their study, the "enabler" teaching style (a very learner-centered style) was preferred by over fifty percent of the students. Males and females did not differ in their preferred teaching styles. As to a learning style, both male and female preservice agriculture teachers tended to prefer a field-independent learning style. In other studies females had tended to prefer a field-dependent learner style, but the prospective female agriculture teachers were more content-oriented and less social-centered than females in general.

Some questions:

1. Is it appropriate to ask preservice students who have yet to have their teaching experience what they prefer for a teaching style?
2. Were the sample sizes large enough to generalize to preservice agriculture teachers?
3. Is there enough difference in the percentages to say that one style is preferred over another?
4. What might be the reason that the 1992 group seemed to be more field-independent than the 1991 and 1990 groups who were fairly evenly divided between the two styles?

The descriptions of teaching styles need to be more complete or might be replaced with a graphic. According to the descriptions provided, the teaching styles of "expert," "provider," "facilitator," and "enabler" do not seem to fit on a continuum, yet the domains of sensitivity and inclusion could certainly be measured on a scale, low to high.

The authors are to be commended for raising the question about the use of the problem-solving approach with students with both field-dependent and field-independent learning styles. Another question they raise is why did their subjects seem to prefer learning in a content-centered manner but wish to teach in a learner-centered manner? Both of these questions deserve further study.

ANALYSIS OF AGRISCIENCE TEACHER INSERVICE NEEDS

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INTRODUCTION

Agriculture is one of the fastest changing industries in America. Advances in biotechnology, genetic engineering, international marketing, and other areas have broadened the scope of agriculture. Growth in aquaculture and specialized production systems, emphasis on environmental protection, and the development of advanced breeding methodologies require a knowledgeable work force that can solve problems and use critical thinking skills (National Council on Vocational Education, 1990).

As a result of the many changes in agriculture, agricultural education has also changed. In the early 1980's vocational agriculture was primarily a program designed to prepare individuals for employment in food and fiber production. By 1990, vocational agriculture had diversified and become an instructional program designed to prepare students for eventual employment in agricultural production, biotechnology, applied sciences, and other diversified areas of agriculture. In 1989 and 1990 Louisiana upgraded the secondary agriculture curricula for use in agriscience programs. The revised Louisiana agricultural science curricula included a greater emphasis on science and math and addressed a broader spectrum of agricultural occupational areas including food science, entomology, environmental protection, biotechnology, natural resource management, and diversified agricultural production. With the new curricula, teachers can better prepare their students for challenging careers in today's world of agriculture.

For the new curricula to be successfully implemented, teachers must have adequate knowledge and skills to teach the revised curricula. In Nebraska, Dillon (1989) found a major barrier to implementing a revised agribusiness course was a lack of knowledge on the part of the teachers. Osborne and Miller (1985) found that teachers who have a high level of ability in certain skill areas are more confident in their ability to demonstrate these skills. They also noted that confident teachers taught the skills more often, and used methods involving live specimens and student practice more frequently. Teachers who lack confidence in performing a skill teach about the skill area, but seldom do they actually demonstrate the skill or teach students in an actual hands on situation. Burnett and Yahya (1987) found beginning vocational agriculture teachers in Louisiana felt a greater need for knowledge and skills in each of the major technical areas than they possessed upon graduation from college. These beginning teachers identified their lowest levels of knowledge and skills in the areas of agribusiness/farm management, use and conservation of natural resources, and high technology as applied in the agriculture industry.

Many Louisiana agriscience teachers completed their college degrees a number of years ago. The science skills they learned such as using a microscope, preparing slides, balancing a scale, etc. may have been forgotten over time. The new agriscience curricula include competencies that involve biotechnology skills and concepts. Teachers may feel they have an inadequate knowledge base to teach some areas of the new curricula. Now, these same teachers must teach and prepare their students in these same skill areas for employment. Kirby (1990) reported that teachers in North Carolina felt a lack of teacher knowledge was one of the major barriers in teaching agriscience and biotechnology. Other investigators (Iverson, Boreing, Robinson, and Carpentier, 1991) found teachers had high levels of interest in various areas of biotechnology, but they perceived their knowledge of these areas to be limited.

One method for improving the teachers' knowledge base is through inservice workshops. Teachers perceived inservice workshops to be the most effective means for learning about biotechnology (Kirby, 1990). Birkenholz and Harbstreit (1987) reported that first year teachers rated skill improvement as their top priority for assistance through teacher inservice programs. According to Frick (1991) agricultural educators must make a commitment to life-long learning to facilitate changes in the curriculum. He stated, "new skills and knowledge to teach cutting edge subjects are needed to implement innovative curriculum changes" (Frick, 1991, p. 19).

The development of teacher inservice programs is the next step for implementing the revised agricultural science curricula. Information is needed to identify the technical areas in which teachers feel they need inservice assistance. This information will serve as a basis for planning inservice programs.

PURPOSES AND OBJECTIVES

This study sought to identify specific areas of the revised Louisiana agricultural science curricula in which teachers need increased knowledge and skills for teaching. The specific objectives were:

1. To describe selected demographic characteristics of agriscience teachers in Louisiana.
2. To determine agriscience teachers' preferences in selection of time schedules and types of presenters for future inservice programs.
3. To identify agriscience teachers' self-perceived knowledge and skill levels for selected topic areas in the revised agricultural science curricula.
4. To determine topic areas in the revised agricultural science curricula for which agriscience teachers need inservice assistance.
5. To determine if relationships exist between the agriscience teachers' perceived level of knowledge and skills, and selected demographic variables.

PROCEDURES

Population

The population for this study was the 226 agriscience teachers in Louisiana. All 226 teachers were mailed surveys for the project.

Methodology

An advisory committee helped guide the administration of the project. The advisory committee met to review the objectives of the study and to offer suggestions for successful completion of the project. The committee consisted of a representative from the Office of Vocational Education, a secondary science teacher, and an agricultural science teacher. The committee also assisted in development of the instrumentation.

Instrumentation

The first part asked for selected teacher demographic variables that were identified in the literature as being related to teacher knowledge. Teachers were also asked to indicate their preferences for time schedules and types of presenters used in the inservice programs.

In the second part of the instrument, agriculture teachers rated their level of knowledge and skills for each item using a four point scale. The Basic Program of Agricultural Science in Louisiana (Ag I & Ag II) and the Advanced Program of Agricultural Science in Louisiana (Ag III & Ag IV) were examined to identify new or revised lessons for inclusion in the instrument. Eight topic areas and the specific revised lesson titles in each topic area were included in the instrument. Applied science skills that were needed for teaching these areas were also identified and included in the instrument.

The content validity of the instrument was assessed and verified by the advisory committee and two agricultural teacher educators. The internal consistency of the topic scales was measured by Cronbach's alpha. All topic scales had an alpha level of 0.87 or better. This level was acceptable for the study.

Data Collection

The instrument and a cover letter were mailed to each of the 226 agriscience teachers in Louisiana. A second mailing of the instrument was sent to nonrespondents two weeks after the initial mailing. Each mailing was followed by a postcard mailed one week after each instrument. A total of 178 teachers responded to the mailings. Thirty of the nonrespondents were contacted by phone and reminded to return the instrument. Twenty-eight instruments were returned by these individuals. Two additional unsuccessful attempts were made to contact the two nonrespondents. All 206 responses were useable. A comparison of the responses from the mail versus phone respondents revealed no significant differences between the two groups. The data were combined for analysis.

DATA ANALYSIS

Teacher preferences for inservice time schedules and presenters were transformed into a mean rating score for each item. Rankings were converted to numerical values. First choice rankings were set equal to 3 and second choice rankings equaled 2. Third choice rankings equaled 1. The totaled item score was then divided by the number of respondents ($\underline{N}=206$).

Knowledge and skill items were examined for common topic areas. Nine scales were identified. In a confirmatory factor analysis, each item loaded at 0.5 or greater on its respective scale. This shows that there was a common underlying dimension or factor for each scale. Mean scores were calculated for each scale for each respondent. Descriptive statistics including frequencies, percents, and means were used to describe the demographic characteristics of the population and the mean scale scores.

Pearson's correlations were used to determine relationships between selected demographic variables and scale scores. For the nominal variables, point biserial coefficients were approximated by the Pearson's correlation coefficients. Correlations were interpreted using the set of descriptors proposed by Hinkle, Wiersma, and Jurs (1979).

RESULTS

Objective 1 - Demographic Characteristics of the Agriscience Teachers in Louisiana

The teachers had taught secondary agriculture for an average of 14.2 years. Nearly half (49.2%) of the teachers had taught secondary agriculture for eleven to twenty years. There are 21.5% of the teachers with more than twenty years of teaching experience. Teachers received their B.S. degrees an average of 16.5 years prior to the study. A total of 174 (84.5%) teachers were members of the Louisiana Vocational Agriculture Teachers Association (LVATA).

There were 77 (37.4%) teachers who taught one or more nonagricultural science courses. A total of 24 teachers reported they taught the eighth grade earth science course; 20 teachers taught physical science; and 18 teachers taught environmental science. Other science courses taught by the agriscience teachers were biology ($n = 13$), 7th grade life science ($n = 10$), general science ($n = 10$), and chemistry ($n = 5$).

Over one-third of the teachers ($n = 71$) taught six agriculture classes per semester. Only three teachers (1.5%) reported teaching a sixth grade agricultural course; 31 teachers (15.0%) taught a seventh grade course. Forty five respondents (21.8%) taught eighth grade agriculture courses. A total of 184 teachers (89.3%) taught Agriscience I, 170 teachers (82.5%) taught Agriscience II, 156 teachers (75.7%) taught Agriscience III, and 148 teachers (71.8%) taught Agriscience IV.

An average of 83 students per teacher were enrolled in agriscience courses. Teachers were to report any students who were enrolled in more than one agriculture course only once. More than 31% of the teachers reported 100 or more students enrolled per teacher.

Objective 2 - Agriscience Teachers' Inservice Preferences

The agriscience teachers selected their time preferences for scheduling inservice programs (Table 1). The overwhelming choice for inservice programs was during the summer leadership camp with 102 (49.5%) first choice selections and a mean rating of 2.06 (highest possible mean rating was a 3.0). The camp lasts four days and teachers may be involved in inservice programs while their students attend leadership development sessions. The second choice was for weekday meetings during the summer ($M = 1.35$). The third time preference ($M = 0.87$) was for weekday meetings during the school year.

The teachers were asked to select the type of presenters they prefer for inservice meetings (Table 2). University faculty members received the highest ratings with 63 first choices and a mean rating of 1.52. Agricultural industry representatives ($M = 1.30$) were the second choice. Other agriscience teachers were the third choice ($M = 1.08$). All other choices had mean ratings of 0.85 or less.

Objective 3 - Agriscience Teachers' Self-perceived Levels of Knowledge and Skills

Scores for each of the nine topic scales were calculated as indicators of the teacher's self-perceived level of knowledge and skill in each topic area. The overall grand means for the topic scales are presented in descending order in Table 3.

Table 1

Teacher Preference for Scheduling of Inservice Programs (*N*=206)

Times	Mean rating	Rank
Summer leadership camp	2.06	1
Weekday meeting during the summer	1.35	2
Weekday meeting during the school year	0.87	3
Night meeting during the summer	0.40	4
Night meeting during the school year	0.25	5
Saturday meeting during the summer	0.25	6
Saturday meeting during the school year	0.17	7
Other times	0.04	8

Table 2

Teacher Preference for Inservice Program Presenters (*N*=206)

Inservice presenter	Mean rating	Rank
University faculty members	1.52	1
Agricultural industry representatives	1.30	2
Other agriscience teachers	1.08	3
State or area extension personnel	0.85	4
Agricultural agency representative (USDA, SCS, etc.)	0.78	5
Other types of presenters	0.04	6

There were six topic scales with mean scores above 2.5 which indicated the teachers perceived they had sufficient knowledge or skills in those areas. Soil science received the highest mean with a score of 3.11 on the four point scale. More than 25% of the teachers (n = 55) perceived they had strong knowledge and skills in the soil science area. An additional 60% (n = 121) of the teachers responded that they had sufficient knowledge and skills for the soil science scale. The soil sciences scale contained eight items that addressed the areas of formation, composition, properties and conservation of soil and soil water.

The plant and soil fertility was the second highest topic scale with a grand mean of 3.03. Nearly 20% (n = 42) of the teachers indicated they had strong knowledge or skills in plant and soil fertility. More than 65% (n = 134) indicated they had sufficient knowledge and skills in this area. The seven plant and soil fertility scale items were related to plant nutrition, soil fertility and pH, fertilizers and the application of fertilizers.

Four other topic scale means were between 2.5 and 3.0. They were basic animal science (M = 2.84), basic plant science (M = 2.78), pest management (M = 2.61) and natural resource management (M = 2.52). The remaining three scales had means between 2.0 and 2.5.

The basic animal science scale contained seven items related to the areas of anatomy and physiology, nutrition and feeding, and diseases and parasites of livestock and poultry. Nearly 84% (n = 172) of the teachers indicated they had sufficient or strong knowledge and skills for this area. There were nine items in the basic plant science scale that were related to basic plant growth, plant production, and plant reproduction. Over 72% (n = 149) of the teachers felt they had sufficient or strong knowledge and skills in the area of basic plant sciences. The pest management scale contained eleven items that covered the areas of pesticide use and the pesticide alternatives. Over 54% (n = 113) of the teachers indicated they had sufficient or strong knowledge and skills in the area of pest management. The five items in the natural resource management scale addressed the areas of wildlife conservation and management and environmental protection. Nearly 50% (n = 102) of the teachers felt they had sufficient or strong knowledge and skills in natural resource management.

Table 3

Means of Teachers' Self-perceived Levels of Knowledge and Skills by Topic Areas in Agricultural Science (*N*=206)

Topic area	Number of items	M	S.D.	Cronbach's α
Soil science	8	3.11	.55	.95
Plant & soil fertility	7	3.03	.53	.89
Basic animal science	7	2.84	.58	.89
Basic plant science	9	2.78	.48	.87
Pest management	11	2.61	.56	.92
Natural resource management	5	2.52	.63	.88
Animal science biotechnology	12	2.39	.55	.90
Applied science skills	7	2.24	.64	.90
Plant science biotechnology	10	2.10	.57	.91

Note: 1=I do not have the knowledge and skills, 2=I have some knowledge and skills, 3=I have sufficient knowledge and skills, 4=I have strong knowledge and skills. Midpoint ranges were used for interpretations.

Objective 4 - Topic Areas in Which Agriscience Teachers Need Inservice Assistance

Mean scale scores below 2.5 were considered indicators of topics in which teachers need inservice assistance (see Table 3). The lowest mean (M = 2.10) was in plant science biotechnology. Only 19.1% (n = 39) of the teachers indicated they had sufficient or strong knowledge skills in this area. The plant science biotechnology scale included ten items related to tissue culture, hydroponic production, genetic engineering, and plant genetics. Applied science skills (M = 2.24) included science skills such as using microscopes, preparing slide and specimens, and conducting experiments. Nearly 32% (n = 65) of the teachers indicated they had sufficient or strong knowledge or skills in the area of applied science skills. Animal science biotechnology had a mean of 2.39 and included twelve items related to animal reproduction, vaccinations and the immune system. Many teachers (61.8%) indicated they had some knowledge or skills in the area of animal science biotechnology. However, only 34% of the teachers (n = 69) indicated they had sufficient or strong knowledge or skills in that area.

Objective 5 - Relationships Between Agriscience Teachers' Scale Scores and Selected Demographic Characteristics

Selected teacher characteristics were compared with teacher's mean topic scores to determine if relationships existed among these variables. The demographic characteristics used were years since receiving B.S. degree, years of secondary agriculture teaching experience, membership in LVATA, teaching other science courses, number of agriculture courses and students taught. None of the correlation coefficients were greater than 0.20. According to the preselected descriptors (Hinkle, Wiersma, and Jurs, 1979), correlation coefficients below 0.30 indicate very little, if any correlation. It was determined there were no relationships between teacher demographic characteristics and their topic scale scores.

CONCLUSIONS AND RECOMMENDATIONS

1. The population of agriscience teachers in Louisiana is aging. With nearly 22% of the teachers already having completed twenty years of teaching experience, Louisiana may begin to experience an increase in retirements in the next ten years.
2. Agriscience teachers prefer inservice programs that are presented at the summer leadership camp or on weekdays during the summer. Weekday programs during the school year are the teachers' third time preference. Agriscience teachers do not want inservice programs presented on Saturdays during the school year.
3. Efforts should be made to use knowledgeable university faculty members, agricultural industry representatives, or other agriscience teachers to present inservice programs.
4. Agriscience teachers feel they have sufficient knowledge and skills for teaching basic soil science and soil and plant fertility. They also rate their knowledge and skills for basic plant science, basic animal science, pest management, and natural resource management as sufficient. Inservice programs in these areas are not a high priority.
5. Agriscience teachers rate their levels of knowledge and skills in plant science biotechnology, applied science skills, and animal science biotechnology as low. The Louisiana Department of Education should conduct inservice programs in these areas as soon as possible. Plant science biotechnology should receive the highest priority for inservice programs.
6. No relationships exist between the teacher's mean topic area scores and selected demographic variables.
7. Recommendations for further study: Although, the number of years teaching experience was not related to the level of teacher knowledge and skills in technical agriculture topics, current teacher certification requirements need to be examined to ensure that teachers entering the profession possess the technical agriculture competencies needed in the future.

Agriscience teacher inservice programs are needed to enable teachers to be effective teachers in their agriscience programs. This study has determined that the inservice programs should be presented during the annual summer inservice and leadership camp. These inservice programs should be presented by qualified university personnel whenever possible. The initial programs must be in the area of plant science biotechnology. Other programs that must be planned in the near future would address the areas of applied science skills and animal science biotechnology. Additional inservice programs could include information on the specific areas identified as weak items in the other topic scales. This study should be utilized in planning these programs.

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ANALYSIS OF AGRISCIENCE TEACHER INSERVICE NEEDS

A Critique

Larry E. Miller, Ohio State University -- Discussant

Given that funding for keeping teachers up-to-date is increasingly hard to obtain, the delivery of essential competencies during inservice education is of paramount importance. This researcher has attempted to assess the inservice needs of agriscience teachers in those areas which have been recent additions to the curriculum. She has prepared a clearly written and succinct paper which carefully and thoroughly describes her theoretical framework, procedures, and outcomes.

The study was a census of all of the teachers in Louisiana and the researcher reported the control of measurement and nonresponse errors which could affect the outcome of this investigation. The methods appear sound. The data analysis was appropriate, but I had some difficulty with the decision to label any correlation which was of lower magnitude than .30 as being "no relationship".

Teachers were asked to rate their level of knowledge and skill. Is it possible that I might have knowledge and no skill, or have skill and no knowledge? The related literature actually noted such to be the case, but the researcher did not separate these concepts into cognitive and psychomotor domains. On the 4-point scale, the researcher used 2.5 (the midpoint between 2. "I have some knowledge and skills" and 3. "I have sufficient knowledge and skills") as the point below which, if a mean for an item occurred, then there was a "need" for inservice assistance. Is this break between "some" and "sufficient" a bit arbitrary?

One of my major concerns with the research is with its theoretical definition of what constitutes a "need". Most definitions of a "need" which I have seen includes a component of "the discrepancy between an existing state and a desired state". Given this constitutive definition, I do not see the operational definition of a "need" exhibited in this study. Therefore, the major characteristic investigated might be self-perceived knowledge and skill, but not necessarily a "need". A common needs assessment model seen in the literature in agricultural education is that of Borich, Gary D. "A Needs Assessment Model for Conducting Follow-up Studies", Journal of Teacher Education, 31, 3, May-June 1980, pp. 39-42; See also Barrick, Ladewig & Hedges, "Development of a systematic approach to identifying technical inservice needs of teachers" JAE, 24, 1, 13-19; and Barrick & Powell, 1986 NAERM, 42-47.

The author had a thorough review of the recent literature on technical competencies of teachers of agriculture. The primary characteristic investigated was a "need". Literature abounds on needs assessment in extension evaluation literature and organizational psychology which would help underpin this investigation. The author should be commended for attempting to do a through job of planning inservice programs for agriscience teachers.

ASSESSMENT OF PROFESSIONAL COMPETENCIES OF OCCUPATIONAL TEACHERS

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INTRODUCTION

Preparing teachers with a high level of professional and subject matter competence is a major concern of occupational teacher educators. Another concern is that of providing relevant continuing education or inservice opportunities for teachers to maintain or increase their level of competence and improve their teaching. Experience shows that continuing education for teachers contributes a great deal to the achievement of quality teaching (Bing and Zhiling, 1991).

Determining content or topics of inservice programs can be a difficult problem for teacher educators. Barrick, Ladewig, and Hedges (1983) used the Borich Needs Assessment Model to determine the inservice needs of vocational agriculture teachers in Ohio. They concluded that using the model results in priorities based on more than a survey of desires or felt needs.

Barrick and Powell (1986) indicated that one purpose of conducting a needs assessment is to build a foundation for providing inservice education. The strength of an inservice workshop and the follow-up evaluation depends upon planning, and planning depends upon needs assessment. The collection of information is fundamental in meeting the participants' needs and developing effective workshops.

Doerfert and Barrick (1989) described work in Ohio whereby teacher educators and state vocational education consultants met to determine the competencies which should be taught in preservice and inservice programs for vocational teachers who entered teaching without a degree in some area of vocational education. They further stated that the final list of 25 competencies closely reflected the competencies required for vocational teacher education students in the regular undergraduate program.

Peterson (1983), in his defense of competency based teacher education, indicated that the movement generated a massive list of teacher behaviors which provided a basis for program development or at least a standard by which an institution could measure the relevance of its course based approach. Students in teacher education programs could clearly see what was expected of them. He also noted that the movement has the potential for providing a research benchmark.

A competency based vocational education project in North Dakota produced a validated task list for a vocational-technical education teacher (North Dakota State Board for Vocational Education, 1989). The validated list consisted of 120 tasks categorized by general duties of a vocational-technical teacher. The tasks are competencies which a competent vocational teacher should be able to perform well. The task list can be used by teacher educators as a basis for developing undergraduate, graduate, and continuing education courses or inservice workshops. It can also serve as a basis for assessing the competency level of program graduates or teachers in the field.

PURPOSE AND OBJECTIVES

The purpose of this study was to assess the perceived level of competence of occupational education teachers in Nevada with regard to professional occupational education teacher competencies. Another purpose was to use the results of this information to determine the inservice or continuing education needs of occupational teachers in the state. Objectives of the study were to:

1) determine teaching characteristics of the responding teachers;

2) determine the perceived level of competence of occupational education teachers in their ability to perform professional teaching competencies; and

3) determine inservice or continuing education needs of occupational education teachers based on the results of their perceived competence levels.

PROCEDURES

The target population for this study was occupational education teachers in Nevada. The Nevada School Districts Licensed Staff Directory (Nevada Department of Education, 1990) was used to identify the occupational education teachers in the state, which consisted of a total of 448 individuals. A sample of 224 individuals was drawn by determining a random starting point and selecting every other occupational teacher listed in the directory.

Data for this study were collected by use of a mail survey instrument. The instrument was developed by the researcher by using the North Dakota Validated Task Listing: Vocational-Technical Education Teacher (North Dakota State Board for Vocational Education, 1989). The tasks of the validated task list were converted to items for which teachers indicated their level of competence. The first part of the questionnaire asked teachers to provide information about their teaching assignment. The second part of the instrument consisted of 120 competency (task) statements categorized by various functions of an occupational teacher. The teachers were asked to indicate their perceived level of competence in carrying out each of the competencies using the following scale: 4 = highly competent, 3 = moderately competent, 2 = somewhat competent, and 1 = not competent.

Prior to constructing the questionnaire, the task list was validated with a panel of Nevada occupational education teachers even though it had been validated in North Dakota. The panel was also used to pilot test the instrument for content validity. In addition, a university class consisting of both graduate and undergraduate students were used to conduct the pilot test. The questionnaire was revised based on suggestions from the pilot tests. The questionnaire along with a cover letter and return envelope was sent to teachers in the sample in April, 1991. Non-respondents were followed up with a second mailing three weeks later.

A total of 158 useable questionnaires were returned resulting in a 70.5 percent response rate. Early respondents were compared with late respondents on 25 randomly selected items. A t-test indicated no significant differences between early and late respondents. Therefore, the results were generalized to the entire population (Miller and Smith, 1983).

ANALYSIS OF DATA

All data were analyzed using the Statistical Package for the Social Sciences, Personal Computer version (SPSSxPC). Descriptive statistics were used to analyze the data. The t-test was used to compare early and late respondents. The reliability of the instrument was determined to be .93 using Cronbach's Alpha.

RESULTS

The first objective sought to determine the teaching characteristics of the responding teachers. Teaching characteristics data collected included program area, teaching level, years of teaching experience, and type of school district and is reported in Table 1. Program areas of the responding teachers were 3.8% in agricultural education, 28.7% in business education, 29.9% in home economics education, 12.1% in industrial arts, 24.2% in trade and industrial education, and 1.3% in health occupations. A total of 19.1% taught at the middle school, 72.6% at the high school level, and 8.3% at both levels. A total of 9.5% of the respondents had three years of teaching or less, 15.2% had four to six years, 13.9% had seven to nine years, and 61.4% had ten years or more. The type of school district the responding teachers taught in were 58.2% urban, 35.7% rural, and 6.1% taught in both.

The second objective was to determine the perceived level of competence of occupational education teachers in their ability to perform professional teaching competencies. Table 2 reports that occupational education teachers in Nevada felt most competent to perform the competencies in the category of preparing for instruction (X=3.66) followed by the categories of managing the instructional environment (X=3.51), evaluating instruction (X=3.43), implementing instructional strategies (X=3.39), performing guidance activities (X=3.27), and planning the vocational-technical program (X=3.22). Each of the mean scores indicates the teachers generally felt moderately to highly competent in those categories of tasks. The occupational education teachers felt less competent in performing the competencies in the categories of advising a vocational student organization (X=2.90), performing school-community relations activities (X=2.74), coordinating cooperative education activities (X=2.49), and utilizing curriculum assistance (X=2.48). These mean scores represents perceived competence levels from somewhat to moderately competent.

Due to limited space, a complete listing of the 120 competencies cannot be provided. Therefore, a summary of the items rated highest and lowest in each category will be presented. Tasks rated highest in the category of preparing for instruction were develop lesson plans (X=3.72) and select instructional materials (X=3.68), and the task rated lowest was develop a program of instruction for each course (X=3.61). Managing the instructional environment tasks rated highest were provide for student safety (X=3.73), inventory department equipment and supplies (X=3.62), and submit required reports/records (X=3.62). The task rated lowest was maintain a resource library (X=3.15). In the category of evaluating instruction, track student progress (X=3.72) and determine student grades (X=3.71) were rated highest, while establish student performance criteria in the affective (attitudes) domain was rated lowest (X=3.24). Introduce a lesson (X=3.72), use the chalkboard (X=3.71) and summarize a lesson (X=3.70) were tasks with highest mean scores in the category of implementing instructional strategies. Use telecommunications systems (X=2.74) and use electronic instructional systems (X=2.88) were rated lowest in instructional strategies. In the category of performing guidance activities, tasks rated highest were refer students to others for specialized assistance (X=3.42) and provide information on educational career opportunities (X=3.32). Utilize conference techniques was rated lowest in this category with a mean score of 3.18. Develop program goals and objectives (X=3.57) and plan the program

Table 1

Teaching Characteristics of Respondents

Factors	Number	Percent
Program Area:		
Agricultural education	6	3.8
Business education	45	28.7
Home economics education	47	29.9
Industrial arts	19	12.1
Trade and industrial education	38	24.2
Health occupations	2	1.3
Unreported	1	
	158	100.0
Teaching Level:		
Middle school	30	19.1
High school	114	72.6
Both levels	11	8.3
Unreported	3	
	158	100.0
Years of Teaching:		
Third year or less	15	9.5
4 to 6 years	24	15.2
7 to 9 years	22	13.9
10 years or longer	97	61.4
	158	100.0
Type of School District:		
Rural	56	35.7
Urban	93	58.2
Both	8	6.1
Unreported	1	
	158	100.0

Table 2

Summary of Mean Scores by Competency Category

Category	Mean*
Preparing for Instruction	3.66
Managing the Instructional Environment	3.51
Evaluating Instruction	3.43
Implementing Instructional Strategies	3.39
Performing Guidance Activities	3.27
Planning the Vocational - Technical Program	3.22
Advising a Vocational Student Organization	2.90
Performing School-Community Relations Activities	2.74
Coordinating Cooperative Education Activities	2.49
Utilizing Curriculum Assistance	2.48

Scale: 4 = highly competent, 3 = moderately competent, 2 = somewhat competent, and 1 = not competent.

course of study utilizing appropriate statewide curriculum guide (X=3.44) were competencies rated highest in the category of planning the vocational - technical program. Maintain a program advisory committee was rated lowest (X=2.91). Tasks in the category of advising a vocational student organization with highest means were supervise activities of a vocational student organization (X=3.04) and guide student participation in a vocational student organization (X=2.99). The lowest rated item was assist with state/regional/national organizing and supervising (X=2.73). Conduct an open house (X=3.16) and give informative or promotional presentations (X=2.89) were tasks rated highest in the category of performing school-community relations activities, and arrange for television presentations (X=2.21) was rated lowest. Coordinating cooperative education activities competencies rated highest were provide feedback to student on employer evaluation (X=2.67), assist on-the-job supervisors to evaluate student progress (X=2.60), and supervise an employer-employee appreciation activity (X=2.60). The item "develop written agreements with training sites" was rated lowest in that category with a mean score of 2.33. Competencies in the overall lowest rated category receiving the highest rating were request assistance from professional associations (X=2.78) and request assistance from private business (X=2.78). The lowest rated tasks in that category were request a Vocational Education Curriculum Materials (VECM) search (X=2.16) and request assistance from the National Center for Research in Vocational-Technical Education (X=2.16).

The third objective was to determine inservice needs of occupational education teachers based on the results of their perceived competence levels. Using the competency categories and based on the perceived competence levels of occupational teachers, inservice workshops or courses are most needed in the areas of utilizing curriculum assistance, coordinating cooperative occupational programs, performing school-community relations activities, and advising vocational student organizations.

CONCLUSIONS AND RECOMMENDATIONS

The results of this study indicate that the largest groups of occupational education teachers responding were teaching in the program areas of business education, home economics, and trade and industrial education. A majority of the teachers were teaching in an urban high school and had ten years or more of teaching experience.

Nevada occupational education teachers felt at least somewhat competent in all areas studied. The highest levels of competence were in areas related to teaching such as preparing for instruction, managing the instructional environment, evaluating instruction, and implementing instructional strategies. The areas in which teachers felt least competent were utilizing curriculum assistance, coordinating cooperative education, performing community relations, and advising vocational student organizations. Because this research reports composite data of occupational education teachers, it is recommended that further analysis of data be conducted to determine if there are teachers within certain program areas or in certain teaching situations where perceived competency levels differ from others.

The results of this study indicate that inservice education is most needed by Nevada occupational education teachers in cooperative occupational education programs and advising vocational student organizations. The other areas in which "weak" competency levels were reported might best be included within content of other courses. It is recommended that inservice or continuing education opportunities be provided to address the categories in which perceived competency levels were lowest.

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ASSESSMENT OF PROFESSIONAL COMPETENCIES OF OCCUPATIONAL TEACHERS

A Critique

Larry E. Miller, Ohio State University -- Discussant

Like the prior Neason study, this investigation attempts to identify the competencies of teachers, in this case occupational teachers, with the intent of aiding in the design of inservice education programs. The theoretical framework is based upon "needs" assessment, and Luft quotes several papers which devised systems for needs assessment.

Refer to the critique of Neason's paper for a discussion related to the assessment of "needs". This study, likewise, does not really operate with an operational definition of a "need". Given that elements of the rating scale were 2 = somewhat competent and 3 = moderately competent, the lowest item mean I saw reported was a 2.16 (above somewhat competent) and the lowest domain mean was 2.48. Therefore, what is the need? Where is the discrepancy between what is and what should be? Dr. Luft assessed the teacher's perception of what is, but not what should be the desired state. Therefore, prescribing what should be is arbitrary and it would be hard to design an inservice program from the outcome.

Technically, the five errors of survey research are sampling, selection, frame, nonresponse and measurement. The author used a 50% sample, but offered no information on what margin of error or risk this entailed. Why was 50% chosen? No assurances were provided that frame or selection errors did not occur. The author noted that nonresponse error was controlled. Measurement error is comprised of validity and reliability concerns. The author notes that content validity was assured by a panel of experts, but no mention is made of reliability. At the very least, internal consistency reliability coefficients should have been provided because the author did summate the data by domain. No data is provided to show that the individual items contributed to the assessment of the domains as presented in Table 2. Table 2 presents means without providing standard deviations, which should always be included with means.

Effective inservice programs are based upon the needs of the group to be served. Attempts to design programs around needs are commendable. The question remains, however, are we really measuring "needs"?

ASSESSMENT OF EFFECTIVENESS OF IDAHO POSTSECONDARY VOCATIONAL-TECHNICAL EDUCATION AS PERCEIVED BY 1987-88 PROGRAM COMPLETERS

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INTRODUCTION

The year 1992 marks the 75th anniversary of the Smith-Hughes Act, which first established federal funding for vocational education. Since passage of the Smith-Hughes Act, vocational education has experienced changes in skills, occupations, teacher requirements and competencies, educational and work environments, and student characteristics (Wallrodt, cited in David et. al., 1983). However, the fundamental goal of vocational education, most widely accepted by vocational education advocates, has not changed -- preparing people to enter into and remain in gainful employment:

> Those who, in 1917, spoke for vocational education maintained that the schools had an obligation to serve those who moved from the high school into the world of work, as well as those who moved on to college, and that vocational education should therefore be provided... (Leighbody, 1972, p. 5).

According to Brown and Choy (1988), "Students are consumers of vocational education. When they choose a vocational program, they purchase skills, knowledge, a credential, and access to future employment opportunities" (p. 1).

Have vocational-technical education programs been effectively preparing students for the purpose advocated for 75 years? "In vocational education, as in other areas of education, assessment of performance outcomes is increasingly viewed as a way to measure program quality and to motivate program improvement" (U.S. Department of Education, 1991, p. i). Thus, federal education policies are moving rapidly toward emphasizing student performance as a measure of program accountability. Leighbody (1972) wrote, "Nearly every aspect of vocational education needs to be critically examined and, through research, either validated or changed, and this must be a continuing process" (p. 106).

Research and vocational education, however, have not always been analogous. Recently, though, in part because of the Carl D. Perkins Vocational and Applied Technology Education Act of 1990, the Idaho State Division of Vocational Education has concerned itself with the effectiveness of Idaho postsecondary vocational-technical programs.

PURPOSE AND OBJECTIVES

While each postsecondary vocational-technical education institution in Idaho, through a locally administered follow-up study, assesses student outcomes in a variety of ways, there has been no comprehensive, centrally conducted follow-up study. According to Palmer (1984), "... the lack of control for respondent bias and the data collection inconsistencies in state-wide reports make it highly probable that the findings are not representative of the graduate population." (p. 13)

Therefore, Idaho's postsecondary vocational-technical institutions and the Idaho State Division of Vocational Education contracted with the Department of Agricultural and Extension Education at the University of Idaho to conduct a state-wide follow-up study of 1987-88 postsecondary vocational-technical education program participants.

This study was conducted to assess the effectiveness of Idaho's postsecondary vocational-technical programs as perceived by completers of postsecondary vocational-technical education. The specific objectives of the study were to:

1. describe the completers of postsecondary vocational-technical education programs on selected demographic and situational characteristics.
2. determine the satisfaction with the vocational-technical education received as perceived by the postsecondary vocational-technical education program completers.

PROCEDURES

A correlational research design directed the study. The target population of this study was all 1987-88 Idaho postsecondary vocational-technical education program participants at the six Idaho postsecondary vocational-technical institutions. Each postsecondary institution supplied the researchers with the transcripts of their 1987-88 participants and the most current address of each subject available at the postsecondary institution. The target population for the study was 2343 program participants (**completers and leavers**). After two mailings to validate and update the addresses supplied by the postsecondary institutions, a total of 1641 program participants (**completers and leavers**) were identified as the accessible population.

Dillman's Total Design Method, using four mailings of the questionnaire, was followed to obtain a 47% response rate for this census study. A questionnaire and follow-up letter were mailed to nonrespondents two to three weeks between mailings. From those who responded, the researchers identified the 641 who **completed** vocational-technical programs. Nonrespondents were compared to respondents using transcript items shown in a high school follow-up study in Idaho (Stenberg and Riesenberg, 1991) to be significant -- gender, GPA, age, total credits earned, institution attended, and completer/leaver status. No significant differences were found.

The Idaho Student Follow-up questionnaire (ISF) was designed to allow Idaho postsecondary vocational-technical education program participants to assess the effectiveness and outcomes of their postsecondary vocational-technical education. The 36-item questionnaire assessed employment history, current employment situation, job satisfaction, and demographic information. The ISF instrument was validated by a panel of judges deemed to be experts in the area of follow-up research. Questionnaire items were created and modified according to the suggestions of the experts. A pilot test of the questionnaire was conducted using 15 students enrolled at one of the postsecondary vocational-technical institutions; the students were not subjects in the study.

ANALYSIS OF DATA

This study was an exploratory census, thus data were summarized using descriptive statistics. Analyses for differences in satisfaction with postsecondary vocational-technical education were conducted using the SPSSx statistical programs: Reliability, Chi-square, Mann-Whitney *U* Test, Friedman, and Kruskal-Wallis One-way Analysis of Variance Test. In all cases, the alpha level for significance was set at 0.05.

The reliability coefficients (Cronbach's alpha) for the two subsets of interrelated Likert-type scaled variables used in this newly developed instrument were: current satisfaction with previous education related choices, three items, 0.6128 and rating of selected aspects of their postsecondary education program, eight items, 0.8517.

RESULTS

OBJECTIVE 1

The respondents of this study consisted of 641 program **completers** who were enrolled in postsecondary vocational-technical education programs in the state of Idaho during the 1987-88 school year. More specifically, the majority of participants (38%) were program completers at Boise State University, 25% of the participants were program completers at Idaho State University while an additional one-fourth were from Eastern Idaho Technical College and North Idaho College. Approximately 15% of the participants were program completers at College of Southern Idaho and Lewis-Clark State College. The proportion of respondents in this study compared to total number of participants is retrograde for Boise State University and Idaho State University.

The respondents of this study completed postsecondary vocational-technical programs in 10 areas with the greatest percentage of participants completing programs in Mechanical Trades (22%) and Business and Office (20%). Nearly one-fourth of the participants completed programs in Health Related Occupations and Electronics while the smallest percentage of participants (1%) completed programs in Agriculture.

Forty-five percent of the program completers in this study completed vocational-technical programs with a 3.50 - 4.00 grade point average (GPA). Approximately 10% of the participants completed programs carrying a 2.49 GPA or below.

Nearly 60% of the participants in this study were males. Males comprised 61.5% of the 1987-88 program enrollees. Nearly 94% of participants were Caucasian; the other 6% were Native American, Hispanic, Black, Asian, or of other ethnic origin.

Nearly one-half (48%) of the program completers participating in this study were, at the time of this study, less than 30 years old. An additional 29% of the participants were 30 to 39 years of age while approximately 22% were 40 years old or more.

Nearly one-half (48%) of the subjects in this study reported their highest level of education attained was a postsecondary certificate. An additional 27% of the participants had received a postsecondary degree while five percent reported receiving an Associate of Arts degree. Sixteen percent of the participants reported completing some college requirements while five percent reported receiving a Bachelor of Science degree.

Slightly more than 33% of the postsecondary vocational-technical education program completers fathers' highest level of education was a high school diploma. Over one-fourth (26%) of the participants reported their father had not attained a high school diploma. Five percent of the participants indicated their father had received a postsecondary degree while 17% reported their father had received a college degree. Just under 40% reported that their mother's highest level of education was a high school diploma. Twenty percent of the participants reported their mother had attained less than a high school diploma. Eight percent of the participants indicated their mother had received a postsecondary degree while 13% reported their mother had received a college degree.

OBJECTIVE 2

Participants of the study were asked to identify the individual(s) most helpful in selecting a postsecondary vocational-technical education program and planning a course of study. Seventy percent of the participants reported "self" as the individual most helpful in selecting a postsecondary vocational-technical education program. Others reported as being helpful included: postsecondary instructor/counselor/recruiter, friends, and high school teacher/counselor.

In planning a postsecondary course of study, 43% of the participants indicated the course of study was predetermined while nearly 31% reported "self" as most helpful in planning a course of study. Others reported as being helpful included: postsecondary instructor/advisor, postsecondary counselor, and parents/friends.

Nearly 42% of study participants indicated their current (or most recent) job was very related to their postsecondary vocational-technical education plans. Seventeen percent reported their current (or most recent) job was not related to their postsecondary vocational-technical education plans. Two percent indicated they had made no job plans during their postsecondary education.

Approximately 60% of participants reported they had received formal training for their current job. When asked the source of the formal training, the participants were permitted to report more than one source. Thus, over 77% of the participants indicated the formal training was postsecondary education (see Table 1). An additional 25% reported the formal training was received through high school while 12% indicated the formal training was through another trade, business or career school. Other sources of formal training included: military service (8%), college or university (7%) and junior or community college (5%).

Table 1

Source of Formal Training for Current Employment

	Frequency	Percent
High school	96	24.5
Postsecondary education program	303	77.3
Other trade, business or career school	45	11.5
Junior or community college	20	5.1
College or university	27	6.9
Military service	33	8.4

Note. Some respondents indicated more than 1 source.

Of the respondents indicating they had received formal training for their current job, approximately 60% agreed with the statements, "I am able to apply most of what I learned in my formal training" and "the tools and equipment I was trained to use are similar to the ones I use in my job". Just over 60% of the respondents who had received formal training disagreed with the statement, "the way the job is done is quite different from the way I was trained". Approximately 90% of the respondents who had received formal training reported either strong agreement or agreement with the statement, "I consider the formal training a wise choice and a good investment".

Participants in this study indicated the person or agency most helpful in finding their first job was the employer (31%). The program completers in this study reported the second most helpful person or agency was a postsecondary instructor (17%). Sixteen percent indicated a relative or friend was helpful. Other helpful persons or agencies included: postsecondary school placement service, advertisements, or other services.

Twenty-one percent of the respondents reported difficulties finding their first job. Those experiencing difficulties were asked to indicate as many sources of difficulties as possible (Table 2). Of those who experienced problems, 53% indicated "lack of experience" and "no jobs available" as the major sources of problems.

Table 2

Major Problems Finding First Job

	Frequency	Percent
Lack experience	72	53.3
No jobs available	71	52.6
Lack training	26	19.3
Lack education	20	14.8
Did not know where to look	10	7.4
Did not know how to look	7	5.2
Family responsibilities	7	5.2
Appearance	3	2.2
Lack ability	2	1.5
Health problems	2	1.5
Could not read or write properly	1	.7

Note. Some respondents indicated more than 1 source.

As can be seen in Table 3, regarding choosing a postsecondary **school**, 86% of 1987-88 postsecondary vocational-technical education program completers revealed satisfaction with their choice. In addition, 79% of the study participants reported satisfaction with their choice of a postsecondary vocational-technical education **program**.

Table 3

Current Satisfaction with Previous Education Related Choices

	Frequency Percent				
Previous education choices	VS	S	D	VD	MD
Choice of postsecondary school	260	292	38	25	26
	40.6	45.6	5.9	3.9	4.1
Choice of postsecondary program	234	275	49	30	53
	36.5	42.9	7.6	4.7	8.3

Note. VS = very satisfied, S = satisfied, D = dissatisfied, VD = very dissatisfied, MD = missing data

As indicated in Table 4, approximately one-half of participants rated "teaching and instruction", "classes and courses", and "admission and registration processes" as "good" on a scale of "excellent, good, fair, or poor". Just over one-third of the participants rated "teaching and instruction" as "excellent".

Just over one-third of the participants in the study rated "school's career guidance services", "school's student support services", "extra-curricular activities", and preparation for life outside of work" as "fair" on the scale reported above.

Table 4

Rating of Selected Aspects of Postsecondary Vocational-Technical Education Program

	Frequency Percent			
Selected aspect of postsecondary program	Excellent	Good	Fair	Poor
The teaching and instruction	224	308	80	25
	34.9	48.1	12.5	3.9
The classes and courses	186	344	94	11
	29.0	53.7	14.7	1.7
The school's career guidance services	80	246	227	76
	12.5	38.3	35.4	11.9
The school's student support services	65	249	238	67
	10.1	38.9	37.1	10.5
The extra-curricular activities	63	225	240	75
	9.8	35.1	37.5	11.7
The admission and registration processes	66	337	180	53
	10.3	52.5	28.1	8.3
Your preparation for life outside of work	78	260	219	71
	12.2	40.5	34.2	11.1
Your preparation for the world of work	117	296	168	49
	18.3	46.2	26.2	7.6

CONCLUSIONS

1. Completers of postsecondary vocational-technical education programs in Idaho are pleased with their postsecondary education.
2. Recruitment, career guidance and placement efforts in the postsecondary vocational-technical education institutions need to be strengthened.
3. The completers of postsecondary vocational-technical education programs in Idaho are predominantly white males.

4. Program completers are viewed by potential employers as "lacking in experience" upon completion of postsecondary vocational-technical education programs.

5. Students in postsecondary vocational-technical education programs come from homes where education may not be highly valued.

IMPLICATIONS

1. Postsecondary vocational-technical education institutions in Idaho should continue to offer needed classes and courses, quality teaching and instruction, and "user-friendly" admission and registration processes to students.

2. Postsecondary vocational-technical education institutions must develop and/or promote career guidance services to aid students in the daily planning and selection of courses, and in their search for employment.

3. Postsecondary vocational-technical education institutions should implement recruitment strategies rather than relying upon students to self-select their institution. Those recruitment strategies should also make an effort to target nontraditional enrollees into the vocational-technical programs.

4. Postsecondary vocational-technical education institutions must incorporate cooperative occupational experiences into the programs to allow students to acquire experience as well as skills before entering the job search.

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ASSESSMENT OF EFFECTIVENESS OF IDAHO POSTSECONDARY VOCATIONAL-TECHNICAL EDUCATION AS PERCEIVED BY 1987-88 PROGRAM COMPLETERS

A Critique

Larry E. Miller, Ohio State University -- Discussant

Few researchers in our profession have concentrated upon postsecondary education, and fewer yet upon its outcomes. This was a noble effort to employ a uniform system across the state of Idaho. The paper is clearly written, succinct, and provides sufficient methodological evidence to substantiate its conduct.

The results and conclusions seem warranted given the data which were collected. The second objective of the study was to determine "satisfaction" with the postsecondary program. Yet, the title and theoretical framework note that "effectiveness" was the primary characteristic of interest, and, under procedures, the term "outcomes" is mentioned. If the authors purport to assess effectiveness, then I ask if student "satisfaction" constitutes the entire domain of effectiveness? Is it a valid construct which constitutes what it purports to measure, all it purports to measure and only what it purports.

My point is simply that I believe the effectiveness of a postsecondary program is much broader, and includes many other dimensions, than just the students' satisfaction with the identified components. Perhaps this could have been remedied by titling the study "students' satisfaction with" and building the theoretical framework around that construct. The broad scope of the introduction seems to promise greater things than were delivered by the study.

Nevertheless, this study is a beginning at a statewide follow-up system. These, and future, researchers may wish to look at other variables as they expand the study such as amount of time to locate first job, duration of time on the job, number of jobs held, employers ratings of students' performance, etc.

KNOWLEDGE, SKILLS, AND EXPERIENCES NEEDED BY EMPLOYEES IN AGRIBUSINESS

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INTRODUCTION

Globalization, interdependence, and competition in world agricultural markets have created a need for greater understanding of the marketing systems in the United States and the world. According to Harris (1989), today's agribusiness environment consists of sophisticated customers, beset with intense competition, razor thin profits, and rapidly changing production and business technologies (p. 39). As a result, new skills and programs will need to be developed to meet the emerging educational needs in agriculture, especially agribusiness.

During the past decade, several researchers have examined the educational needs of agribusiness employers and employees. In a study of urban agribusiness employers, Harbstreit, Stewart & Birkenholtz (1989) reported that managers/supervisors perceived a greater need for training employees in human relations, leadership, motivation, and decision making. However, they also perceived less need for training in the technical areas of crop production and integrated pest management.

In 1991, Blezek & Dillon surveyed agricultural educators and agribusinesses to determine the skills, attitudes and knowledge that should be taught in Nebraska's schools to prepare students for a variety of agriculture careers. Findings indicated that eight skills were perceived as important by both groups. The skills identified as important for students seeking employment were: honesty, integrity and fairness, interest in learning, positive work ethics, and willingness to work. For college bound students, reading comprehension, written communication, and math and computation skills were rated critically important in addition to the four previously mentioned skills.

In a study of agricultural workers in the Columbia basin of Washington, Hansen, Holmes & Jimmerson (1989) found businesses that featured supplies and services were the largest employers of agricultural workers. Supervisors in these businesses rated general math, oral and written communication, and organizational skills as top three non-technical competencies needed by agricultural workers. Furthermore, 88% of the supervisors indicated that experience in agriculture was necessary for individuals seeking careers in agribusiness industries.

Harris (1989) studied the perceptions of 17 salesmen in Southern Illinois, to determine the skills and characteristics needed by undergraduates seeking careers in agricultural sales. She identified six skill areas: business and economic skills, computer and quantitative skills, technical skills, communication skills, interpersonal skills and previous experience in agriculture. The salesmen rated interpersonal skills the highest, followed by communication skills, business and economic skills, previous work experience, technical skills, and computer skills. The specific skills that were rated very important within the six skill areas included: positive work attitude, self motivation, ability to work with others, self confidence, being a team player, and loyalty to company. In addition, skills such as being able to speak clearly and concisely in groups, being able to work under a variety of conditions, the ability to work and speak concisely with associates, and high moral and ethical standards, were also rated high by the sales persons.

Spotanski and Foster (1989) examined the perceptions of Nebraska's vocational agricultural instructors and agribusiness managers regarding entry level employment skills in agriculture. The instructors and managers identified 22 skills as important for employment in agribusiness. Customer relations skills and communication skills were rated as most important by instructors and managers. Seven skills were identified as seldom or not important for employment in agriculture. These were: the ability to use a computer, word processing skills, profit and loss calculation, computer programming, preparing a newspaper advertisement, selecting advertising media, planning a floor layout, and determining stock turnover.

Possessing knowledge, skills, and experiences relative to agribusiness is crucial to employees in agribusiness. Identification of knowledge, skills, and experiences for students majoring in agribusiness will help determine what their needs are and how those needs can be met. In addition, identification of these characteristics will help: (1) students making career choices, and (2) departments and colleges of agriculture modify curricula.

Literature is replete with studies relative to knowledge, skills, and experiences needed by employees and students pursuing a career in agribusiness. However, there is little information available regarding how employees perceive the effectiveness of their skills and abilities match their needs to perform on the job.

PURPOSE AND OBJECTIVES

The primary purpose of the study was to determine the importance of knowledge, skills, and experiences for employees in agribusiness. A secondary purpose was to determine the self-perceived ability of the employees to perform these skills on the job. The objectives of the study were:

1. To identify the knowledge and skills that employees consider important on the job.
2. To determine the employee's self-perceived ability to perform the knowledge and skills identified as important.
3. To determine if the knowledge and skills that employees considered important can be performed on the job.
4. To determine the perceptions of employees regarding the importance of previous experiences in pursuing a career in agribusiness.

PROCEDURES

The sample consisted of 40 agribusiness employees from Pennsylvania Farmers Association who participated in a workshop on agribusiness at Penn State during spring semester of 1992. The employees performed a variety of tasks relative to farm managing, record keeping and farm finances.

The researchers developed a questionnaire to collect data for the study. The questionnaire had seven sections. Sections one through five measured the importance of knowledge and skills and self-perceived ability to perform those skills in five areas: (1) business and economics; (2) technical; (3) communication; (4) computer; and (5) interpersonal. The items in these five skill areas was measured on a Likert-type scale. The importance scale ranged from 1 "not important" to 5 "very important." The ability scale ranged from 1 "not able" to 5 "very highly able." Section six consisted of nine items that measured (on a scale 1 "not important" to 5 "very important") the importance of previous work experience. Section seven elicited demographic data such as age, gender, educational level, major area of study, and work experience. A panel of experts consisting of four faculty members at The Pennsylvania State University judged the questionnaire to have acceptable content and face validity. A post-hoc reliability analysis indicated that the questionnaire had acceptable reliability (Cronbach's alpha ranged from .81 to .84 for the five skills areas and previous work experience).

A cover letter explaining the purpose of the study and a copy of the questionnaire was distributed to the participants. Thirty-five employees returned the questionnaire for a response rate of 87.5%. The data were analyzed using frequencies, percentages, means and standard deviations. Spearman rho, a non-parametric statistical technique, was used to determine the level of agreement between importance and self-perceived ability rankings.

The following limitation to the study was identified: the respondents were from Pennsylvania Farmers Association attending a farm management workshop at The Pennsylvania State University in

Spring 1992. Therefore, any conclusions drawn from this study are limited to the individuals attending the workshop.

RESULTS

Ninety-one percent of the employees were males. The average age of employees was 42 years. A majority of them held a bachelor's degree (80%), followed by master's degree (14%) and two year associate degree (6%). On an average, employees had 17 years of experience. Accounting was the most frequent major (20%), followed by agribusiness & agricultural economics (17% each), business administration (14%), animal science (11%), mathematics (9%), agricultural education (6%), education and general agriculture (3% each).

Objective 1, 2 & 3

Table 1 summarizes the "importance" and "ability" ratings for technical skills. Livestock production systems (3.74), basic crop production (3.68) and specialized crop production systems (3.54) were the three technical skills that employees rated "important."

As shown in Table 2, the top five business and economic skills that were rated "important" include: identifying business risks (4.34), managing business risks (4.26), interpreting financial statements (4.25), managing taxes and coordinating human resources (4.11 each), recognizing business opportunities (4.06), and managing budgets (4.03).

Almost all skills in the communications area were rated "important" by the employees. As shown in Table 4, speaking clearly with associates received the highest rating (4.46), followed by giving clear instructions to associates (4.37), speaking clearly in group presentations (4.31), listening to instructions (4.31), summarizing information (4.28), and expressing creative ideas verbally (4.06). However, writing technical reports (3.37) was rated "moderately important" by employees.

In the area of computer skills (Table 3), use of computer in decision making (3.74) was rated "important" followed by interpreting statistical outputs (3.73), use of spread sheets and word processing programs (3.71). The computer skills that were rated "somewhat important" included designing computer programs (2.40) and designing management informations systems (2.53).

As shown in Table 5, the interpersonal skill, being self-motivated (4.65) was rated "very important" followed by exhibiting positive work attitudes (4.51) and high moral/ethical standards (4.51). All other interpersonal skills were rated "important" by the employees.

Table 1. Means, Standard Deviations and Rankings for Technical Skills that Employees Perceived Important and their Self-perceived Ability to Perform these Skills

	Importance*			Ability**		
Technical Skills	Mean	SD	Rank	Mean	SD	Rank
Livestock production systems	3.74	.82	1	3.20	.83	1
Basic crop production systems	3.68	.79	2	3.08	.82	2
Specialized crop production systems	3.54	.74	3	2.86	.81	3
Soil chemistry and characteristics	3.17	.92	4	2.46	.85	5
Biological sciences	3.08	.78	5	2.54	.92	4
Food processing technology	2.86	.97	6	2.17	.75	6
Engineering technology	2.77	.91	7	2.14	.84	7
Overall	**3.26**	**.66**	-	**2.64**	**.60**	-

*Scale: 1=not important to 5=very important
**Scale: 1=not able to 5=very highly able
Spearman rho=.96; n=7; p ≤ .001

Table 2. Means, Standard Deviations and Rankings for Business and Economic Skills that Employees Perceived Important and their Self-perceived Ability to Perform these Skills

	Importance*			Ability**		
Business and Economic Skills	Mean	SD	Rank	Mean	SD	Rank
Identify business risks	4.34	.76	1	3.86	.77	4
Manage business risks	4.26	.88	2	3.60	.91	6
Interpret financial statements	4.25	.81	3	3.88	.63	3
Manage taxes	4.11	.79	4	4.26	.74	1
Coordinate human resources	4.11	1.10	4	3.26	.95	10
Recognize business opportunities	4.06	.76	6	3.34	.80	7
Manage budgets	4.03	.85	7	3.63	.91	5
Understand accounting concepts	3.91	.74	8	3.97	.75	2
Analyze investments	3.91	.95	8	3.34	1.08	7
Knowledge of professional selling skills	3.73	.86	10	3.06	.98	14
Knowledge of U.S. agricultural policy	3.73	.63	10	3.12	.74	13
Coordinate physical resources	3.71	.96	12	3.26	.82	10
Understand market administration	3.62	.89	13	2.88	1.04	21
Develop business programs	3.60	1.03	14	3.14	.87	12
Develop market share	3.57	1.06	15	2.74	.92	24
Understanding of national political effects	3.57	.70	15	2.97	.82	17
Knowledge of resource economics	3.45	.75	17	2.94	.82	19
Develop business policies	3.43	.88	18	3.06	.94	14
Knowledge of micro economics	3.43	.97	18	2.94	.84	19
Develop inventory management systems	3.40	1.03	20	2.88	.99	21
Understand organizational structure	3.34	1.02	21	3.34	.97	7
Knowledge of macro (U.S.) economics	3.34	.94	21	2.97	.90	17
Knowledge of international trade concepts	3.33	.96	23	2.67	.74	26
Knowledge of community development	3.33	.99	23	2.85	1.06	23
Knowledge of corporate finance	3.18	.83	25	3.06	.98	14
Understanding of international political effects	3.14	.94	26	2.51	1.01	28
Understand international economics	3.11	1.08	27	2.40	1.09	29
Design process layout	3.03	1.02	28	2.73	.99	25
Design product layout	3.03	1.07	29	2.61	1.00	27
Overall	**3.56**	**.60**	-	**3.07**	**.55**	-

*Scale: 1=not important to 5=very important
**Scale: 1=not able to 5=very highly able
Spearman rho=.84; n=29; p ≤ .005

Table 3. Means, Standard Deviations and Rankings for Communication Skills that Employees Perceived Important and their Self-perceived Ability to Perform these Skills

	Importance*			**Ability****		
Communication Skills	Mean	SD	Rank	Mean	SD	Rank
Speak clearly with associates	4.46	.56	1	3.54	.82	4
Give clear instruction to associates	4.37	.77	2	3.51	.92	5
Speak clearly in group presentations	4.31	.72	3	3.37	.88	7
Listen to instructions	4.31	.76	3	3.68	.63	2
Summarize information	4.28	.75	5	3.71	.82	1
Use professional telephone skills	4.08	.85	6	3.68	.72	2
Express creative ideas verbally	4.06	.84	7	3.34	1.05	8
Express creative ideas in writing	3.88	.87	8	3.31	1.05	9
Write business reports	3.83	.75	9	3.40	.81	6
Critique technical information	3.53	.93	10	2.94	.93	11
Write technical reports	3.37	.91	11	2.97	.95	10
Overall	**4.04**	**.58**	-	**3.42**	**0.67**	-

*Scale: 1=not important to 5=very important
**Scale: 1=not able to 5=very highly able
Spearman rho=.63; n=11; $p \leq .02$

Table 4. Means, Standard Deviations and Rankings for Computer Skills that Employees Perceived Important and their Self-perceived Ability to Perform these Skills

	Importance*			**Ability****		
Computer Skills	Mean	SD	Rank	Mean	SD	Rank
Use computers in decision making	3.74	.70	1	3.06	.97	4
Interpret statistical outputs	3.73	.79	2	3.06	.85	4
Use word processing programs for correspondence	3.71	.98	3	3.05	1.16	6
Use spreadsheets	3.71	.89	3	3.14	1.24	2
Knowledge of general business software	3.68	.59	5	3.09	1.02	3
Knowledge of computer accounting systems	3.62	.65	6	3.29	1.00	1
Use computer controlled processes	3.60	.81	7	2.66	1.13	8
Use statistical methods	3.31	.99	8	2.80	.99	7
Design computer programs	2.40	.94	9	1.97	1.15	10
Design management information systems	2.34	.94	10	2.03	1.01	9
Overall	**3.37**	**.54**	-	**2.79**	**.79**	-

*Scale: 1=not important to 5=very important
**Scale: 1=not able to 5=very highly able
Spearman rho=.66; n=10; $p \leq .02$

Table 5. Means, Standard Deviations and Rankings for Interpersonal Skills that Employees Perceived Important and their Self-perceived Ability to Perform these Skills

	Importance*			**Ability****		
Interpersonal Skills	Mean	SD	Rank	Mean	SD	Rank
Be self-motivated	4.65	.54	1	4.01	.75	3
Exhibit positive work attitudes	4.51	.66	2	3.66	.91	6
Use high moral/ethical standards	4.51	.70	2	4.23	.88	2
Work without supervision	4.41	.61	4	4.29	.94	1
Work under varied conditions	4.28	.62	5	4.00	.64	4
Work with a team concept	4.23	.64	6	3.43	.92	9
Provide leadership	4.08	.66	7	3.34	.91	10
Use constructive criticism	4.06	.94	8	3.46	.95	8
Defend a position on issues	3.97	.82	9	3.63	.94	7
Use delegation principle	3.91	.74	10	3.05	.97	11
Exhibit organizational loyalty	3.88	.83	11	3.86	.94	5
Overall	**4.23**	**.49**	-	**3.71**	**.64**	-

*Scale: 1=not important to 5=very important
**Scale: 1=not able to 5=very highly able
Spearman rho=.59; n=11; $p \leq .05$

Overall, the employees rated interpersonal skills most important (4.23), followed by communications skills (4.04), business and economic skills (3.56), computer skills (3.37) and technical skills (3.26).

In regard to self-perceived ability to perform the skills they identified important, employees perceived themselves as being highly able to perform in the area interpersonal skills (3.71), followed by communication skills (3.42), business and economic skills (3.07), computer skills (2.79), and technical skills (2.64).

Figure 1 illustrates the overall "importance" and "self-perceived ability" rankings for the five skill areas.

To determine if the knowledge and skills that employees rated important are the ones they were able to perform on the job, the level of importance and self-perceived ability rankings were compared. The findings indicated that the importance and self-perceived ability to perform rankings were in high agreement for all the five skills areas: interpersonal skills (Spearman rho=.59; n=11; p <.05), communication skills (Spearman rho=0.67; n=11; p<.025), computer skills (Spearman rho=.76; n=10; p < .025), business and economic skills (Spearman rho=.84; n=29; p < .005), and technical skills (Spearman rho=.96; n=7; p < 0.01).

Objective 4

The employees were asked to rate the importance (on a scale that ranged form 1 "not important" to 5 "very important") of previous work experiences in pursuing a career in agribusiness. Previous farm/ranch experience was rated important (3.40), followed by participation in SOEP (3.17), domestic agribusiness experience (3.08), group/club participation (2.97), and experience in financial institutions (2.88). However, previous experience in government-public affairs (2.08), and international agribusiness firms (2.29), were rated "somewhat important," by the employees.

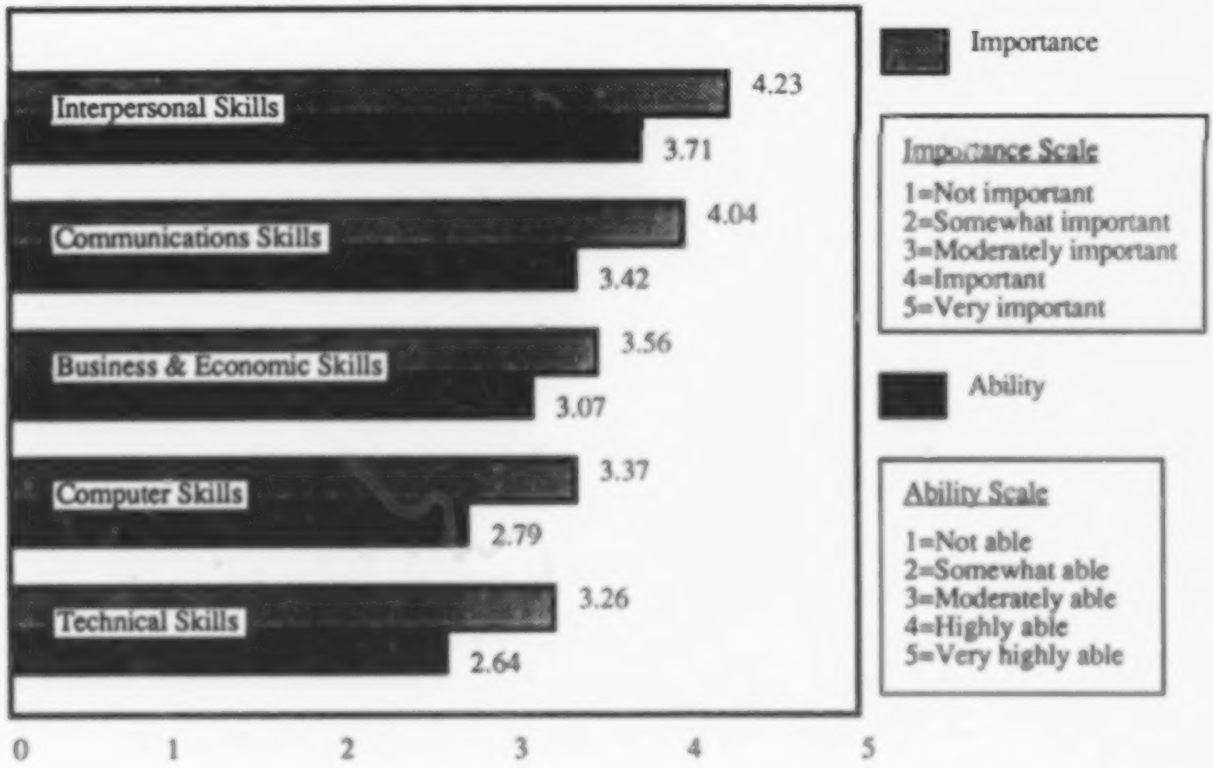

Figure 1. Importance and self-perceived ability rankings for the five skill areas.

Table 6. Means, Standard Deviations and Rankings for Previous Work Experiences

Previous Work Experiences	Mean*	SD	Rank
Work on farm/ranch	3.40	.85	1
Participation in school supervised work experience	3.17	.82	2
Work in domestic agribusiness	3.08	.74	3
Participation in group or club activities	2.97	.92	4
Work in financial institutions	2.89	.76	5
Participation in industry internships	2.74	1.01	6
Work in non-agricultural retail firm	2.49	.74	7
Work in international agribusiness firm	2.29	1.00	8
Work in government/public affairs	2.08	.95	9

*Scale: 1=not important to 5=very important.

CONCLUSIONS AND/OR RECOMMENDATIONS

Employees ranked interpersonal skills as most important requirement for pursuing a career in agribusiness. On the basis of data collected in this study, a typical individual seeking a career in agribusiness can be described as one who is self-motivated, possesses a positive work attitude, can work without supervision, and has high moral/ethical standards. In addition, they should possess excellent communication skills in terms of writing, speaking and listening. Employees indicated that an agribusiness sales person must possess business and economics skills that include interpreting financial data, understanding and managing taxes, managing a budget and recognizing business risks.

Employees rated themselves as being able to perform most of the skills in the areas of interpersonal, communication and business and economic skills. However, employees perceived themselves as being less able to perform in the areas of technical and computer skills.

The knowledge and skills that employees considered important were the ones they were able to perform on the job.

If agribusiness employees need to be knowledgeable of international markets and international trade concepts as many contend, employees will need training in these areas. Further, employees rated these concepts as moderately important and their ability to deliver information in these areas as only somewhat able. While much of the society dwells on America's ability to meet the needs in a global market place, it appears that these employees do not believe that they have the ability to work with farm clients at this level.

These employees ranked themselves being deficient in their overall abilities in communication skills and technical subject matter areas. Training and development opportunities exist in these areas since employees ranked their importance well above their ability to deliver information in these areas.

Employees viewed farm/ranch experience, participation in SOEP, experience in domestic agribusiness and participation in group/club activities as important experiences for individuals considering careers in agribusiness. Therefore, individuals seeking careers in agribusiness should be provided with opportunities in extracurricular affairs and some work experiences through practical training or internships.

A knowledge, skills and experiences profile needs to be developed at high schools and colleges. Such a profile should help high schools and colleges to modify curricula relative to agribusiness education.

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KNOWLEDGE, SKILLS, AND EXPERIENCES NEEDED BY EMPLOYEES IN AGRIBUSINESS

A Critique

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The determination of important skills to be teaching related to agribusiness are important if we are going to purport to have our graduates ready to enter the world of work upon completion of their vocational programs. These researchers asked persons employed in agribusiness to assess the importance and their ability to perform these knowledge and skills on-the-job; and about some other objectives. I believe that the study was well presented and conducted.

The biggest limitation, which they rightly pointed out, is that the study was conducted with a self-selected audience of persons participating in a workshop on agribusiness at Penn State. This greatly limits the importance of this study because there is no way of knowing whether or not this group is representative of other agribusiness employees. Methodologically, the study was well done and aptly described, but the study is true for such a limited group as to constrain its practical importance for the profession.

Some small technical concerns I have are related to the meaning of the reporting of significance levels for the Spearman ρ calculations, which I would perceive to be meaningless in this case of a census with a limited population.

When I reached the conclusions and recommendations section, I began to have some problems when they discussed what agribusiness "sales" people needed when the study did not just deal with sales. Further, they described "deficits" which existed in the competencies; and I did not see deficits previously measured or described.

Are Pennsylvania Farmers Association members participating in a workshop on "farm" management able to speak to "agribusiness" competencies? Is my thinking different that the authors about this group being from production agriculture which would be different that being employed in areas providing sales and services to production agriculture or handling the products from agriculture? What was their definition of "agribusiness"?

EXTENSION EDUCATORS' LEARNING STYLE PREFERENCES AND RELATIONSHIPS WITH PROGRAM RESPONSIBILITY AND LOCUS OF CONTROL

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INTRODUCTION

Adult learning includes the acquisition of knowledge and skills essential to learning effectively in a variety of learning situations. Recognizing the diversity of learning environments is the responsibility of the learner, the facilitator or instructor, the program designer, and the educational agency (Smith & Haverkamp, 1977). Programs in adult education should model and subsequently empower adult learners to diagnose their learning needs, plan their learning program, and evaluate their progress. In adult education, learners and teachers must share responsibility for their educational transactions (Knowles, 1970).

Adult educators attest to adult learners' diversity. Individual differences in motivation, goals, intelligence, cognitive development and academic preparation, employment background, experience, skill level, and initiative become increasingly differentiated as adults grow older (Haverkamp, 1983). If one accepts the premise that information processing skills are needed by educated adults, then education should focus on helping adults diagnose their own situation, organize and process information, and assess what and how much they have learned. Smith (1980) regarded educated persons as those who will "know how they learn, know what they want to learn, and where and how much" (p. 10). He believed "professional educators should be able to assess, plan, implement, and evaluate learning with the twin goals of sharing knowledge and teaching the learning skills to their students" (p. 11).

In Learning how to learn: Applied theory for adults, Smith (1982) explained how learning itself is a synergistic process with learning how to learn. "As we learn, things happen that affect our motivation for further learning and our potential for learning more efficiently, effectively, and meaningfully" (p. 58). The personal effects of educational activities include an inquiring mind, an understanding of change, and an understanding of self as a learner and the learning process. These effects are more likely to accrue when educators take into account the characteristics of adult learners and the conditions under which they learn best. Adult educators must know how adults learn and how to modify the learning environment for differing adults for differing content areas. Application of what is learned must be encouraged by using established subject matter areas as entrees to understanding the nature and potential of knowledge itself and for acquiring the skills of inquiry.

Personal experiences of adults who perceive, think, and respond to stimuli and use a variety of resources and methods while learning develop personal tendencies and preferences, or learning styles. Learning styles are characteristic ways of processing information, feeling, and behaving in learning situations. An important element in facilitating learning is helping learners become aware of their own learning styles. Once learning styles are identified, adult educators may help learners determine which educational methods and learning activities are best suited to their styles of learning (Brookfield, 1990).

Kolb's (1984) experiential learning theory included the concept of learning styles and the more basic concepts of learning and individual development. His theory included major tenets of Dewey (1938) who emphasized the need for learning to be based on life experiences, Lewin (1951) who espoused an active role for the individual while learning, and Piaget (1952) who described intelligence as primarily the result of interaction between a person and the environment. Kolb presented two fundamental elements in the learning process: first is accumulating experience or taking in information in concrete or abstract ways; second is transforming the experience or reflecting upon information essentially as it is or changing the information or oneself to fit one's thinking.

Research has demonstrated that learning style preferences and the consideration educators give to learning styles are closely related to learner achievement, dropout rates, and student satisfaction with instruction (Rollins & Scanlon, 1991; Rollins, 1990; Cox, Sproles, & Sproles, 1988; Price, 1983). Although much of this research did not involve adults, the usefulness of learning-style diagnosis in postsecondary education was clearly demonstrated (Smith, 1982). Despite failing to discover any relationships between learning style preferences and educa-tional techniques used by Kentucky extension agents, Pigg, Busch, and Lacy (1980) concluded that using a learning style inventory may be useful as a participatory approach in the development and conduct of adult education programs. Diagnosing learning styles may help adult educators understand adults' assumptions about teaching and learning, and their behavior in instructional situations.

Extension agents as the first-line managers serve in a critical management role which directly influences the perceived success of the extension system (Brown, 1991). Pareek (1982) and Waldman and Spangler (1989) suggested that management effectiveness is in part related to the managers' behaviors which reflect the psychological orientation preferences of managers to process information and to interact with work teams. The integrated management effectiveness framework, which includes individual characteristics and orientations, job outcome factors and immediate work environment factors, provided the theoretical basis for examining relationships with the agents' learning styles. Pareek (1982) and Rotter (1966) studied the influence of locus of control on decision-making processes and being able to deal with diverse, often uncertain, situations. Witkin and Berry (1975) examined the relationship of ecocultural factors with a person's learning preference, defined by them as field dependent or field independent. The previous research suggests there is a relationship between a person's locus of control and learning preference. Those persons with a greater internal orientation tend to be more effective in working as members of the work team and tend to involve more people in the decision-making process which are more reflective of people with a Converger or Accomodator learning style.

PURPOSE AND OBJECTIVES

State-level extension staff desire to deliver in-service programs for county staff which incorporate the learning style preferences of agents as the programs and instructional activities and materials are designed. The problem is that no empirical assessment of agents' learning style preferences has been completed. State-level staff thus rely on their knowledge of the agents and make judgmental decisions regarding the agents' learning style preferences.

This study empirically documented learning styles of The Pennsylvania State University Cooperative Extension county staff members. Objectives were to: (1) describe learning style preferences of county staff members, and (2) examine the relationships between staff members' learning style preferences and variables associated with staff assignments, gender and locus of control.

METHODS AND PROCEDURES

The population for this study consisted of all 299 Cooperative Extension county staff members in Pennsylvania. County staff members included only those agents whose positions were funded by The Pennsylvania State University. In November 1991, all county extension directors were mailed a package containing personally addressed envelopes for distribution to each professional staff member. Each staff member received a letter explaining the study, the Kolb Learning Style Inventory, and a brief questionnaire relating to their professional position. Each individual was asked to confidentially complete the questionnaire and return it in a stamped, return-addressed envelope. Total responses received by the final cutoff date of February 1, 1992 numbered 248 for a response rate of 83%. The number of usable responses (complete information provided for all variables) for data analysis purposes was 211 (71%). There was a single mailing with no follow-up. Thus the results apply to the 211 people providing usable responses.

INSTRUMENTATION

The Learning Style Inventory (LSI) designed by Kolb (1985 R.) is a self-descriptive instrument used to assess an individual's preferred learning style for dealing with ideas and day-to-day situations. The Kolb LSI results provide information that assists learners identify their learning style and how they absorb and deal with new information. Each of the 12 items requires respondents to rank-order four sentence endings in a way that best describes their learning style. One ending in each item corresponds to one of four learning styles. Scoring is accomplished by determining an individual's relative emphasis on four learning orientations which are more fully described below: Abstract Conceptualization (AC); Concrete Experience (CE); Active Experimentation (AE); and Reflective Observation (RO). Two combination scores are determined, one emphasizing abstraction over concreteness (AC-CE), and the other emphasizing action over reflection (AE-RO). These two combination scores are then used to identify the person's preferred learning style. Reliability estimates (Cronbach's alpha) for the four basic orientations and the two combination scores of the LSI range from .73 to .88.

Abstract Conceptualization (AC) is a conceptually-based, analytic approach to learning. People with an orientation toward abstract conceptualization focus on logic, ideas, precision, and concepts by emphasizing thinking and analyzing ideas rather than feeling. A person with this orientation is good at systematic planning, manipulating abstract symbols, and has a scientific as opposed to an artistic approach to problems.

Concrete Experience (CE) is an experience-based approach to learning. People with concrete experience preferences focus on being directly involved in experiences, dealing with human situations personally, are good at relating to others, and are good intuitive decision makers. They emphasize feeling as opposed to thinking, have an intuitive, artistic approach as opposed to a systematic, scientific approach to problems, and have an open-minded approach to life.

Active Experimentation (AE) is an action-based approach to learning. An orientation toward active experimentation includes practical applications, looking for what works and doing, as opposed to reflective understanding and observing. These people enjoy and are good at getting things accomplished, are willing to take some risk to achieve objectives, and value having influence on the environment around them.

Reflective Observation (RO) is an observation-based (watching), impartial approach to learning. Individuals with a reflective observation style focus on understanding meanings of ideas by observing and describing them. They emphasize understanding as opposed to practical application, are concerned with truth or how things happen as opposed to what will work, and emphasize reflection over action. They appreciate different points of view, rely on their own feelings to form opinions, and value patience, impartiality, and thoughtful judgment (Kolb & Smith, 1986).

Locus of control reflects the extent to which persons perceive that they are responsible for what happens to them. Having a greater internal locus of control is indicative of persons who believe they are primarily in control (responsible) for what happens to them; that is, the outcomes depend primarily upon their own behaviors. Conversely persons with an external locus of control reflect a belief or perception that outcomes are the result primarily of forces external to individuals (Lefcourt, 1982). In this study the modified Rotter Locus of Control Scale was used to assess the degree of internal/external orientation. The Cronbach's alpha reliability coefficient was .71 for the internal subscale and .69 for the external subscale. This represents a marginally acceptable reliability coefficient (Anastasi, 1978), and the authors note it as a limitation of the study.

FINDINGS

Profile of Agents

Data from Table 1 indicate that 57% of the staff members participating in the study were male and the large majority of them (81%) had major program area assignments in agriculture. For purposes of this study, the major program area was defined as one of the four major extension program areas--agriculture, family living, 4-H/youth, or extension director—in which agents were assigned more than 50% of their time. Persons with responsibility as county extension director were primarily males (70%). About 59% of the 4-H/youth agents were male, whereas 93% of the family living agents were female. There was relative similarity in the years of extension experience for agents in the three program areas of agriculture, 4-H/youth and family living. County extension directors averaged about 21 years of total extension experience.

Table 1.
Demographic Characteristics of Staff Members by Program Area Assignment.

Program Area	Gender				Mean Years Extension Experience
	Male		Female		
	N	%	N	%	
Agriculture (N = 75)	61	81	14	19	15.29
Four-H/Youth (N = 46)	27	59	19	41	15.57
Family living (N = 45)	3	7	42	93	13.31
County director (N = 33)	23	70	10	30	20.89
All agents (N = 199*)	114	57	85	43	15.84

*Other agents (12) did not have one major program area commitment.

Learning Style Preferences

A composite LSI score was computed by subtracting the two mean scores on each axis that produced the following average composite scores for all agents: AC-CE = 3.16; and AE-RO = 6.36 (all agents in Figure 1). Although the composite score for all agents falls clearly within the Accomodator quadrant, it does not indicate a strong learning style preference in this area. Figure 1 also illustrates the distribution of county agents for Kolb's Learning Style Grid quadrants by the four major program area assignments. The average composite scores for agriculture, 4-H/youth agents, and county directors placed each of the three groups within the Converger quadrant, although the average composite scores for each group did not indicate a strong tendency of any group of agents in this learning style. The average composite score for family living agents placed them as the single group of staff members in the Accomodator quadrant.

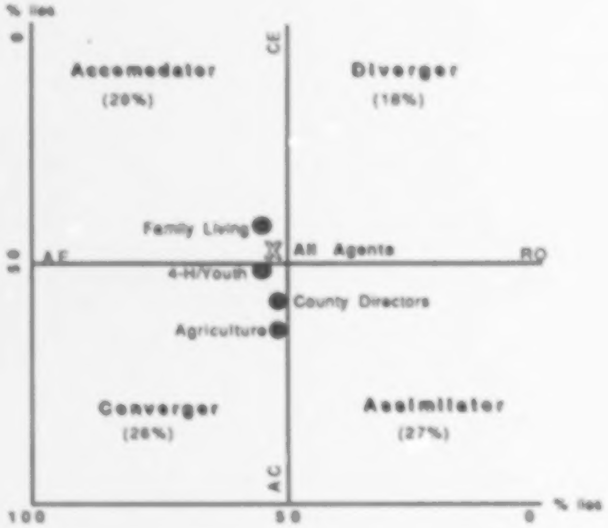

Figure 1.
Kolb's Learning Style Grid and Program Area Assignment of Staff Members.

Data in Table 2 reveal the relative proportion of extension county staff members for each learning style by program area assignment. Family living agents had the smallest percentage of staff members (16%) assessed as having a Converger learning style. Forty-four percent of family living agents had an Accomodator learning style, more than twice as many as in any of the other learning style categories. Agriculture agents were identified most frequently as having the Assimilator (31%) or Converger (32%) learning styles. County directors were almost evenly split between Converger (30%), Accomodator (27%), and Assimilator (24%) learning styles, with the Diverger (18%) learning style occurring the least. The 4-H/youth agents came closest to mirroring the collective group in terms of percentages of agents across the four learning styles.

Table 2.
Distribution of Extension Personnel by Area of Assignment and Learning Style.

Program Area	Learning Style			
	Accomodator	Assimilator	Converger	Diverger
Agriculture (N = 75)	20%	31%	32%	17%
Four-H/Youth (N = 46)	30%	28%	24%	17%
Family living (N = 45)	44%	20%	16%	20%
County director (N = 33)	27%	24%	30%	18%
All agents (N = 199*)	29%	27%	26%	18%

*Other agents (12) did not have one major program area commitment.

Relationships with Learning Styles

Pearson correlation coefficients were computed between learning orientation index values and subscale scores for the two locus of control subscales (Table 3). There were no significant Pearson correlation coefficients between scores on the internal or external locus of control scale and scores on the four learning orientation index scales. Significant, although low, relationships were found between gender and concrete orientation (r_{pt} bis = .14, p = .039) and abstract conceptualization (r_{pt} bis = .17, p = .015). Females were associated with higher scores on the concrete orientation index, and males were associated with higher scores on the abstract conceptualization index. This reflects that males tend to be associated as being more likely to be described as Convergers in terms of learning style and females are associated with an Accomodator learning style. Statistically significant relationships existed between learning style and major area of program responsibility (phi = .26, p = .036). Family living agents were associated with an Accomodator learning style whereas agriculture agents were associated with Assimilator or Converger learning styles.

Table 3
Correlations Between Learning Orientation, Locus of Control Orientation and Gender.

Learning Orientation Index Values	Locus of Control (N=218)		
	Internal Score	External Score	Gender
	r	r	r_{pt} bis
Concrete experience	-.04	.05	.14*
Abstract conceptualization	.11	-.07	-.17*
Active experimentation	.01	-.02	.02
Reflective observation	-.06	.05	.02

*Significant at <.05 alpha.

DISCUSSION

The Converger learning style was most frequently preferred by both agriculture agents (32%) and county directors (30%), but was the least preferred by family living agents (16%). The two dominant learning strengths of a convergent learner are abstract conceptualization (AC) and active experimentation (AE). The strengths of this learning style are individual problem solving, decision making, and the practical application of ideas. Hypothetical-deductive reasoning allows the person to focus on specific problems. Convergers are controlled in their expression of emotion and prefer dealing with technical tasks and problems rather than social and interpersonal issues.

The Diverger learning style was least preferred by the total group of staff members (18%) and least preferred within program assignment areas by agriculture agents, 4-H/youth agents, and county directors. This learning style has the opposite learning strengths from the Converger. A Diverger emphasizes concrete experience (CE), reflective observation (RO) and adaptation by observation rather than action. A Diverger is feeling oriented, interested in people, and imaginative enough to view concrete situations from many perspectives to generate alternative ideas and implications.

An Assimilator learning style was the second most-preferred learning style (27%) by the total group of staff members and accounted for almost one-third (31%) of the agriculture agents' learning styles. These individuals prefer abstract conceptualization (AC) and reflective observation (RO), using inductive reasoning and creating theoretical models. An Assimilator's orientation is less focused on people and more concerned with judging ideas by theoretical precision, not by practical value.

The Accommodator has the opposite strengths from assimilation—doing things, carrying out plans and tasks, and getting involved in new experiences. Accomodators emphasize concrete experience (CE) and active experimentation (AE). This adaptive orientation provides an opportunity for risk taking and action and for those situations that require changing immediate circumstances. Accomodators tend to solve problems in an intuitive, trial-and-error manner and rely on others for information who may see them as impatient and pushy. This learning style was most preferred by the total group of staff members (29%) and 4-H/youth agents (30%), and by 44% of the family living agents. It was not as preferred by agriculture agents (20%) or county directors (27%).

How do the current results compare to earlier studies of extension personnel? In a study of Kentucky county extension agents (Table 4) who were administered Kolb's learning style inventory, the relative positions of the agriculture and 4-H/youth agents were similar; however, they were placed in the Accomodator quadrant rather than in the Converger quadrant (Pigg, Busch, & Lacy, 1980). Kentucky home economics agents occupied the same relative position but in the Diverger quadrant. In the Pennsylvania study, the locations of each of these groups was such that agriculture and 4-H/youth agents are in the Converger learning style quadrant and the family living agents are in the Accomodator quadrant. In both studies however, the total populations of extension agents (all agents) from each state occurred within the Accomodator learning style. County directors were not identified in the Kentucky study.

Table 4.

Percentage of Learning Style Types and Program Area Assignments of Staff Members.[a]

Program Area	Learning Style			
	Accomodator	Assimilator	Converger	Diverger
Agriculture (N = 112)	37%	17%	24%	22%
Four-H/Youth (N = 105)	51%	8%	15%	26%
Home economics (N = 110)	46%	8%	15%	31%
All agents (N = 327)	44%	11%	19%	27%

[a] Table adapted from Pigg, Busch, & Lacy (1980)

IMPLICATIONS AND RECOMMENDATIONS

All four groups of agents identified in this study—agriculture, 4-H/youth, family living, and county directors--preferred to learn by doing, or active experimentation (AE). More than half (55%) of the agents in these groups were either Convergers (26%) or Accomodators (29%) who preferred a learning situation where the teacher is a role model to show them how to do things. Despite being risk takers and extroverted, they prefer small group discussions and individualized, self-paced, learning activities and projects with opportunities to practice and receive feedback while getting things accomplished.

Almost two of every three (64%) family living agents, on the other hand, who were Accomodators (44%) or Divergers (20%) were more inclined to learn from concrete experience (CE). They see the teacher as a coach or helper for learning by intuition and, being sensitive to peoples' feelings, prefer role playing, learning from new experiences and like personalized feedback and discussion. Almost one-half (47%) of the 4-H/youth agents prefer this learning situation.

Although one-half (48%) of the agriculture agents were Assimilators (31%) or Divergers (17%), less than half (45%) of the total staff members were in these two groups. Individuals in these groups learn by perception or reflective observation (RO), by looking inward for meaning from many different perspectives before making considered judgments. They prefer lectures from a teacher who is both a guide, or task master, and will observe different perspectives of an issue.

The majority of agents in each of three groups—agriculture, 4-H/youth, and county directors—preferred to learn by thinking or using abstract conceptualization (AC). They choose systematic learning situations, such as reading about theories, with an instructor or teacher who can communicate clear, well-structured information allowing them to analyze ideas in a systematic method. Almost two of every three agriculture agents (63%) were either Assimilators (31%) or Convergers (32%) and almost equal percentages of county directors (54%) and 4-H/youth agents (52%) had the same learning styles.

Several questions are raised by this study. Will educators responsible for staff development take into account the complexities associated with learning style preferences of agents? Will subject matter be designed and presented to accommodate agents' preferences for learning? What will be the most educationally efficient method to teach state-level staff how to use individual learning style preferences of agents? Regardless of vastly different teaching responsibilities with diverse learners, professional educators must be able to recognize and be sensitive to individual clients with various learning styles. It would seem incumbent upon adult educators to incorporate into their style of teaching information regarding their clients' learning styles. From a total organization perspective, individual learning style preferences need to be aggregated in a meaningful manner to enhance the organization's capacity and effectiveness.

One goal for using information from this study was to increase the capacity for teamwork from an organizational viewpoint. When individuals bring different learning styles to a team, advantages, as well as problems, may be created. Problems attributed directly or indirectly to these differences in learning style do not occur randomly. Much the same way as one's body has evolved specialized organs for special purposes, organizations relate to the environmental context much the same way by specializing into units that deal with that external environment. Careful observation of the strengths inherent in each of the four learning styles leads one to conclude there are major differences. But agriculture agents do what they do for many of the same reasons that family living agents do what they do—they just do "their things" in different ways and accomplish their mission along different routes. There is, indeed, strength in diversity.

From a philosophical management perspective, although these agents need to remain differentiated when relating to their clientele, at some point in time they need to be integrated into and coordinated with the internal organizational environment. Unfortunately, one way this can happen is through the domination of one learning style over another in less adaptive, inflexible organizations. The preferred method is to integrate and adapt to various learning styles which result in an organization that is greater than the sum of its parts. For an organization to pass the test of time and remain flexible and adaptable, all of the diverse, yet subtle, differences in learning styles—action and reflection, concrete and abstract—are needed, if not desired.

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EXTENSION EDUCATORS' LEARNING STYLE PREFERENCES AND RELATIONSHIPS WITH PROGRAM RESPONSIBILITY AND LOCUS OF CONTROL

A Critique

J. Robert Warmbrod, Ohio State University--Discussant

The objectives of the research were to describe the learning styles of county-level extension staff members and to examine relationships between learning style preferences and the staff members' locus of control, gender, and primary area of program responsibility. The research deals with an important topic -- teaching and learning in adult education -- as well as a topic that is central to the content(substance) of agricultural education as an area of study and research in higher education.

The researchers appropriately grounded the research in the literature and research in adult education and psychology with emphasis on learning style and its relationship to educational programing and practice. The paper is written clearly; is instructive; and, requires study, not casual perusal, for understanding. I detect no major flaws in methodology.

My review of the data presented in the paper leads to the following conclusions. For the objective "to describe learning styles of extension staff members," the major message I get is that all learner style categories identified in Kolb's learning style grid are present in proportions sufficient to warrant the recommendation that, whatever the connection between learning style and educational practice, persons planning and conducting inservice education for county extension staff members must provide the gamut of options. For the objective "to examine relationships between learning style and various variables," the weight of the data is that there are not meaningful relationships between learning style and the staff members' gender, locus of control, or primary area of program responsibility.

The researchers devote a portion of the paper to how the four groups of staff members differ on the learning style variable and to very low, but statistically significant, point-biserial coefficients indicating negligible relationships between gender and learning orientation index values. Relying on statistical significance, which in this case is primarily an artifact of sample size, rather than practical significance often diverts attention to minuscule differences or negligible relationships that have little, if any, real importance for educational programing or practice.

Near the end of the paper the researchers raise two highly pertinent questions: Will educators responsible for staff development take into account the complexities associated with learning style preferences of agents? Will subject matter be designed and presented to accommodate agents' preferences for learning? In the "Implications and Recommendations" section of the paper, I anticipated but did not find discussion pertaining to these questions. Such discussion is both expected and warranted by the research.

INCORPORATING INDIGENOUS KNOWLEDGE SYSTEMS INTO AGRICULTURAL AND EXTENSION EDUCATION PROGRAMS: A STUDY OF THE PERCEPTIONS OF EXTENSION PROFESSIONALS

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INTRODUCTION

Dissemination of technologies to increase agricultural production using the conventional transfer of technology (TOT) system has often failed to consider the natural environment (e.g., local watersheds), indigenous knowledge systems (e.g., indigenous soil classification), and resource endowments (e.g., labor availability) around which resource-poor farmers normally operate (Warren et al. 1988; Chambers, 1989; Martin and Rajasekaran, 1990; Gupta, 1991). Continuing intensive agricultural production strategies, while neglecting these grass-roots factors, may worsen the physical, natural, and human environment of resource-poor farmers of the developing world.

An indigenous knowledge system is knowledge based on an awareness, familiarity, conceptualization, and beliefs acquired by local people through accumulation of experiences, non-formal experiments, and intimate understanding of the environment of a given culture, at a specific geographical location and during a specified period of time (Rajasekaran, 1991). Indigenous knowledge systems are learned ways of looking at the world (McClure, 1989). Farmers' knowledge regarding many aspects of agriculture is often broad, detailed, and comprehensive, although this is not always the perception among agricultural scientists and extensionists (Thruston, 1992).

Attitudes generated by the TOT paradigm have precluded learning indigenous knowledge from resource-poor farmers. Reasons for non-adoption of innovations resulting from the conventional TOT paradigm have been attributed to characteristics of the small-scale farmers or an inadequate delivery system but seldom to the characteristics of the innovations themselves (Waters-Bayer, 1989). Technologies recommended through agricultural extension programs are often based on research conducted at regional research stations and usually overlook indigenous agricultural knowledge (Rajasekaran and Martin, 1990). Higher-level extension administrators are less interested in learning from village extension workers (VEWs) about the farmers' cultural practices, preferring to hear about the successful adoption of technologies developed from the research stations. There is a tendency to view the VEWs as mere messengers, ignoring the fact most of them were raised in villages and spent their childhoods on small-scale farms, absorbing the indigenous agricultural knowledge for a given solution (Warren, 1991). VEWs represent an interface between farmers' knowledge and formal agricultural knowledge (Waters-Bayer and Farrington, 1990).

Farmers are mainly seen as the recipients of extension recommendations but not the originators of either technical knowledge or improved practice (Moris, 1991). Farmers' informal experimentation has long been under-perceived (Rhoades and Bebbington, 1988). Farmers' priorities have not traditionally been considered while conducting on-farm research trials (Rajasekaran and Martin, 1990). Farmers are familiar with testing alternative coping mechanisms to avert extreme conditions such as droughts and floods, and researching diversified food production techniques.

Incorporating indigenous knowledge systems into agricultural and extension education programs is essential for: (1) understanding the 'emic' perspectives of local people; (2) bridging the communication gap between outsiders and insiders; (3) recognizing the accomplishments of local farmers; (4) making outsiders familiar with local conditions and abstract terms; and (5) increasing the participation of farmers and their organizations in integrating, utilizing and disseminating what already exists (Rajasekaran, 1991). Understanding local agricultural knowledge would strengthen the extension process, particularly by drawing upon the experience of expert farmers and other persons regarded by the community as being particularly knowledgeable about the environment (Compton, 1989). Hence, understanding farmers' knowledge allows a framework of reference for increasing the effectiveness of agricultural and extension education programs (Scoones, 1989).

It is evident from the aforementioned theoretical framework that agricultural and extension education program effectiveness would be improved if extension professionals had a greater awareness of indigenous knowledge systems. Thus, it is essential that efforts be taken to utilize indigenous knowledge systems while developing agricultural and extension education programs. However, without understanding the perceptions of extension professionals who play a crucial role in implementing these programs, it is difficult to proceed further in this direction. Hence, it was decided to conduct a survey among the agricultural extension professionals regarding their perceptions of indigenous knowledge systems in India.

PURPOSE AND OBJECTIVES

The overall purpose of this study was to identify the perceptions held by agricultural extension professionals in India regarding indigenous knowledge systems and to develop an appropriate model for using indigenous knowledge.

The specific objectives of the study were:

1. To identify the importance of selected indigenous knowledge concepts as perceived by agricultural extension professionals;
2. To identify the use of indigenous knowledge in agricultural extension programs as perceived by agricultural extension professionals;
3. To compare perceptions regarding indigenous knowledge systems according to various levels of extension professionals; and
4. To develop a model for incorporating indigenous knowledge systems into agricultural and extension education programs in India.

METHODS AND PROCEDURES

The study was conducted by researchers at Iowa State University. The research design used for this study was a descriptive survey method as well as a participant observation method. The target population for this study was 962 agricultural extension professionals of the state of Tamilnadu, India. Cluster sampling procedure, were used to draw the sample. There are twenty-four districts in Tamilnadu state and two districts were randomly selected (ten percent of the population). The sample size was 96 agricultural extension professionals. All the extension professionals belonging to the two districts (clusters) were included as the sample for the survey (Thiruvannamalai District=44; Madurai District=52).

A survey questionnaire was developed for the study by the researchers and it was reviewed for content validity by a panel of experts in agricultural and extension education. Cronbach's alpha reliability coefficient values for the instrument were 0.9635 and 0.9042 for the two scaled portions of the instrument. The questionnaire, containing twenty-six statements related to indigenous knowledge systems was used to collect the data from the respondents. A Likert-type scale with points ranging from 1 (Low) to 5 (High) was used to collect information regarding extension professionals' perceptions of selected indigenous knowledge concepts. Zonal workshops in both the districts were attended by the researcher to collect the data directly from the respondents. The zonal workshops are the meeting points where the extension personnel receive technological recommendations from the agricultural research scientists. The extension personnel represent three different hierarchies: Assistant Directors of Agriculture (divisional level), Agricultural Officers (block level), and Village Extension Workers (village level). Requests were made earlier to attend the workshops for data collection. The last half-hour of the workshops was allocated to complete the questionnaire. The researcher attended all of the sessions of the one-day workshops. The information obtained from the workshops was used to interpret some of the data.

Mean scores and standard deviations were computed for all the indigenous knowledge statements to determine the level of agreement regarding selected indigenous knowledge statements as perceived by agricultural extension personnel and also to determine perceptions held by agricultural extension personnel regarding using indigenous knowledge in agricultural extension programs. A t-test was conducted to identify the differences among the various hierarchies of the agricultural extension system as well as the differences between the two districts at .05 alpha level.of significance.

RESULTS

The extension personnel were grouped into two categories for analytical purposes. The Assistant Directors of Agriculture and Agricultural Officers were grouped as "extension administrators." The Village Extension Workers were termed as "field-level extension workers." Table 1 shows the mean ratings and standard deviations regarding the extent to which selected indigenous knowledge statements were important to extension personnel in India. Out of 8 statements, 5 statements were important to extension personnel. The statement, "extension worker's knowledge of local traditions should be given consideration" was considered highly important with a mean rating of 4.46. The statement, "The technology transfer model is appropriate for locally diversified farmers' food production systems" was rated low by the extension personnel. The mean rating was 2.87. With respect to statements regarding incorporating indigenous knowledge systems into agricultural and extension education, 6 statements received mean ratings of 4 and above (Table 2). The statement, "extension workers must learn how to identify and evaluate indigenous knowledge systems" was rated by extension personnel with a mean rating of 4.38. The statement, "extension workers must support farmer-to-farmer information exchanges" received a more neutral rating with a mean of 3.86.

The perceptions of extension administrators differed statistically using a t-test from the field-level extension workers regarding the statement, "incorporate indigenous knowledge component into zonal workshops and bi-weekly training programs" (Table 3). Zonal workshops and bi-weekly training programs are two pipelines of the research-extension delivery system. The extension administrators might not want to disturb the existing system. In other words, making changes in the system is a policy decision. The extension personnel belonging to two different hierarchies did not differ statistically regarding other statements pertaining to incorporating indigenous knowledge systems into agricultural and extension education programs.

It was somewhat surprising to find that the extension personnel, irrespective of their hierarchies, were found to be somewhat aware of the value of indigenous knowledge systems. The limitations of the existing technology transfer paradigm were also recognized by the extension personnel. With respect to incorporating indigenous knowledge systems into agricultural and extension education programs, the extension personnel perceived that three factors were essential for revitalizing the existing agricultural extension system: (1) Exploiting extension workers' knowledge of local traditions; (2) Training the extension administrators and field-level workers on the methodologies for recording indigenous knowledge systems; and (3) Strengthening the feedback mechanism from farmers to extension and then to researchers.

Table 1. Means and standard deviations regarding the extent to which selected indigenous knowledge statements were rated as being important to extension personnel in India (n=96)

Indigenous Knowledge Statements	Mean	S.D.
Extension worker's knowledge of local traditions should be given consideration	4.46	0.64
Scientists continue to ignore farmers' risk aversion strategies	4.29	0.76
Diversified food production is one of the strategies of small-scale farmers	4.11	1.17
Farmers' varying production goals should be considered before designing on-farm research trials	4.06	1.19
The feedback from extension to research is usually the weakest part of the information systems	4.03	1.19
Indigenous knowledge of women in agricultural production is not given due regard by society in general	3.89	1.25
Technological interventions normally overlook the critical linkages among soils, climate, livestock, trees, and crops	3.23	1.42
The traditional Technology transfer model is appropriate for locally diversified farmers' food production systems	2.81	1.79

1=Not important; 2=Low importance
3=Neutral; 4= Highly important; 5=Very highly important

Table 2. Means and standard deviations regarding incorporating indigenous knowledge systems into agricultural and extension education programs (n=96)

Statements Regarding Incorporating Indigenous Knowledge Systems into Extension Programs	Mean	S.D.
Extension workers must learn how to identify and evaluate indigenous knowledge systems	4.38	0.87
Training programs must be conducted to explain the methodologies for recording indigenous knowledge	4.33	1.12
Effective and systematic approach to elucidate feedback information on farmers' problems, constraints regarding technologies	4.21	1.84
Incorporate indigenous knowledge component into zonal workshops and bi-weekly training programs	4.17	1.90
Farmers' forums must be conducted by extension workers to elucidate indigenous knowledge	4.11	1.22
Identifying informal local-level farmer organizations	4.06	1.33
Extension workers must support farmer-to-farmer information exchange	3.86	1.41

1=Not important; 2=Low importance
3=Neutral; 4= Highly important; 5=Very highly important

Table 3. T-values analyzing the differences in perceptions between various hierarchies of extension professionals regarding incorporating indigenous knowledge systems into agricultural extension programs

Statements Regarding Incorporating Indigenous Knowledge Systems into Extension Programs	Extension administrators	Field-level workers	T-value	Probability
Extension workers must learn how to identify and evaluate indigenous knowledge systems	4.21	4.47	.74	.462
Training programs must be conducted to explain the methodologies for recording indigenous knowledge	4.42	4.15	.78	.440
Effective and systematic approach to elucidate feedback information on farmers' problems, constraints regarding technologies	4.06	4.22	.22	.830
Incorporate indigenous knowledge component into zonal workshops and bi-weekly training programs	3.86	4.34	2.82*	.047
Farmers' forums must be conducted by extension workers to elucidate indigenous knowledge	4.21	3.90	.82	.427
Identifying informal local-level farmer organizations	4.12	3.97	.96	.365
Extension workers must support farmer-to-farmer information exchanges	3.76	3.92	.71	.449

*Significant at 0.05 level

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations were made based on the findings of the study:

There is much to be learned from farmers. Agricultural extensionists must be provided opportunities to learn the methodologies for systematically recording the indigenous agricultural knowledge available in every community. We can build upon these new sensitivities to understand farmers' perspectives of risk, how they define their problems and needs as well as their goals and objectives, and how these can provide the basis for an interactive extension program rather than one focused on top-down dissemination of information.

A model to integrate indigenous knowledge systems into agricultural and extension education has been developed based on the findings of the study. Training, recording indigenous knowledge recording, feedback, and integration are the four units of the proposed model. Establishing a national resource center for dissemination and training of indigenous knowledge provides the starting point for the model. The concept of establishing a national resource center was developed by Professor Michael Warren, Director of Center for Indigenous Knowledge for Agricultural and Rural Development (CIKARD). He has pioneered the establishment of 9 national indigenous knowledge centers so far in Nigeria, Mexico, Philippines, Indonesia, Australia, Kenya, Benin, Nepal, and Costa Rica. The role of the national resource center is to act as a clearinghouse for collecting, documenting, and disseminating information on indigenous knowledge on agricultural and rural development. Once extension administrators are trained on the methodologies for recording indigenous knowledge, they can develop training programs for field-level extension workers considering the local cropping conditions and socio-cultural environments. A training manual is essential for introducing the methodologies for identifying and recording indigenous knowledge systems into agricultural extension educational settings. Separate sessions could be allocated during the zonal workshops and bi-weekly training programs to educate the methodologies for recording indigenous knowledge systems.

Participant observations, unstructured interactions, participatory meetings, and indigenous taxonomies are some of the examples of the methodologies for recording indigenous knowledge systems. The details of these methodologies are described in Warren and Rajasekaran (1991). Using these methodologies, the field-level extension workers are expected to identify and record indigenous knowledge systems pertaining to agricultural production in their respective areas. The indigenous knowledge systems thus collected should be fed back to the extension-research system via bi-weekly training programs and zonal workshops.

Integrating indigenous knowledge systems and research station technologies form the final unit of the proposed model. After receiving the feedback information concerning indigenous knowledge systems, the research station scientists should systematically classify the data/information according to disciplines (for instance, crop varietal selection, soil health care practices, water management). On-station and on-farm research projects should be conducted by the respective discipline scientists based on the classified indigenous knowledge systems . For example, the plant breeders may use indigenous knowledge regarding crop varietal selection.

Sensitizing the agricultural and extension education community to learning from resource-poor people and their understanding of the natural resource environments should be one of the essential principles of agricultural and extension education programs in the years to come. Devaluing indigenous knowledge systems as “low productive,” “primitive,” and “old” is no longer a useful attitude. Dissemination of research station technologies is essential to increase agricultural production, but they should be carefully built on the foundation of indigenous knowledge of resource-poor people in order to successfully accomplish the mission of food security and the preservation of natural resources for future generations.

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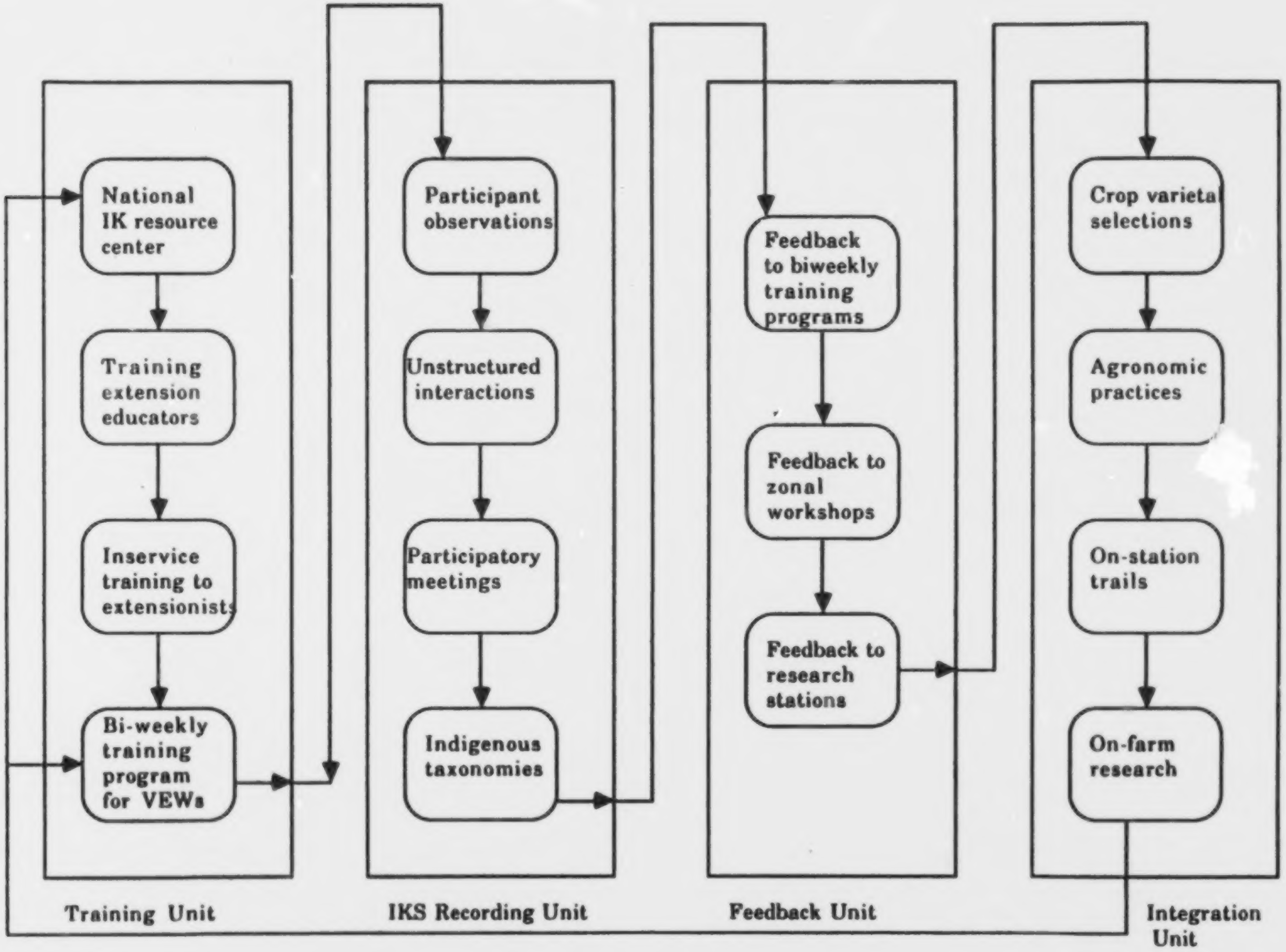
National IK resource center
Training extension educators
Inservice training to extensionists
Bi-weekly training program for VEWs
Participant observations
Unstructured interactions
Participatory meetings
Indigenous taxonomies
Feedback to biweekly training programs
Feedback to zonal workshops
Feedback to research stations
Crop varietal selections
Agronomic practices
On-station trails
On-farm research
Training Unit
IKS Recording Unit
Feedback Unit
Integration Unit

Figure 1. A Model for Incorporating Indigenous Knowledge Systems into Agricultural and Extension Education Programs

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INCORPORATING INDIGENOUS KNOWLEDGE SYSTEMS INTO AGRICULTURAL AND EXTENSION EDUCATION PROGRAMS: A STUDY OF THE PERCEPTIONS OF EXTENSION PROFESSIONALS

A Critique

J. Robert Warmbrod, Ohio State University--Discussant

The researchers begin the paper arguing logically and convincingly of the necessity of incorporating indigenous knowledge systems into agricultural and extension education programs designed to disseminate technology. Their argument, drawn from the references cited, concludes with the two major propositions. First, "agricultural and extension education program effectiveness would be improved if extension professionals had a greater awareness of indigenous knowledge systems;" and second, "without understanding the perceptions of extension professionals..., it is difficult to proceed further in this direction." From the clearly written introduction and background, the researchers draw two purposes of the research: (1) to identify the perceptions held by agricultural extension professionals in India regarding indigenous knowledge systems and (2) to develop a model for using indigenous knowledge. Extension administrators and field-level extension workers responded to 26 Likert-type statements that constitute two scaled portions of the instrument. Data are reported for 15 of the 26 statements.

I raise three questions regarding methodology and interpretation. (1) Why are data reported for only 15 of the 26 statements that constituted the two scaled portions of the instrument? (2) Cronbach's alpha reliability coefficients are reported for the two scaled portions of the instrument. These indices of reliability pertain to summated scores calculated for the two portions of the instrument. All of the analyses reported pertain to individual statements, not to summated scores for all items constituting each portion of the instrument. The reliability coefficients are not relevant to the analyses reported, hence the question of reliability of responses to individual statements is not addressed. (3) Multiple t-tests are used to investigate differences in mean responses between administrators and field-workers. The results of seven t-tests were reported with only one statistically significant t-value. The researchers should communicate to readers that they are aware of the likelihood of an inflated alpha when multiple t-tests are calculated. It would not be farfetched to argue that the one statistically significant t-value could very well be a chance occurrence.

My concluding comment pertains to the model described in the paper, purportedly with its empirical base derived from the research reported in the paper. The researchers do not make explicit how the responses of agricultural extension professionals to 26 statements constitute an empirical base for the model. The model makes perfectly good sense, but to claim that it was derived from the research reported in the paper is neither evident nor convincing.

RELATIONSHIPS BETWEEN PERSONAL, FAMILY, AND EXTENSION POSITION CHARACTERISTICS AND JOB SATISFACTION OF EXTENSION 4-H EDUCATORS

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INTRODUCTION

In recent years families and their lifestyles have changed. An increasing divorce rate has resulted in more single parent families. In addition, more women, especially mothers, have entered the work force (Masnick & Bane, 1980; Englebrecht & Nies, 1988). Working and single parents have less time to spend with their children.

Role conflict exists when there is a disruptive relationship between an individual's personal and professional lives (Burden, 1982). Ways in which work and life away from work are related have been studied by Near, Rice, and Hunt (1980), Near, Smith, Rice, and Hunt (1983), Sorcinnelli and Near (1989), and Staines (1980). Sorcinnelli and Near (1989) studied relationships between job satisfaction, nonwork satisfaction and life satisfaction and ways in which pressures of professional and private life are balanced in university faculty members. They studied the extent to which faculty used hypothesized spillover, compensation, and segmentation mechanisms for relating work to non-work. According to the spillover hypothesis, which applied to the largest proportion of the faculty, experiences or feelings associated with work directly "spill over" to life outside work and vice versa. Job characteristics may influence nonwork satisfaction, nonwork characteristics may influence job satisfaction, and nonwork and work satisfaction may influence one another. With the compensation hypothesis, individuals compensate for disappointments in one sector (work or personal) by seeking rewards in the other sector. The segmentation hypothesis proposes that work and life outside of work are separate from one another.

Studies of relationships between work and family life in Cooperative Extension personnel have focused upon the impact of Extension employment upon the family and personal lives of Extension employees (Hebert & Kotrlik, 1990; St Pierre, 1984). Recent attention has been given to the impact of personal and family life upon professional commitment (C. F. Bowen, Keyser, & Radhakrishna, 1991), effectiveness (Keyser, C. F. Bowen, & Radhakrishna, 1991), and job satisfaction (Hebert & Kotrlik, 1990) of Extension personnel.

St. Pierre (1984) conducted in-depth interviews with Pennsylvania Cooperative Extension personnel to study the ways in which their work affected their family life. Extension work affected the family lives of the agents more negatively than positively. Agents with children under age 12 reported strain from pressure to work more hours and the desire to spend more time with their families. Four-H agents, whose jobs required more work at times normally spent with families (evenings, weekends, and summers) were less satisfied with their jobs than non-4-H agents.

Spousal satisfaction with the agent's job and being a 4-H agent were predictors of job satisfaction in a study of Louisiana extension agents and their spouses (Hebert & Kotrlik, 1990). Number of evenings worked, nights away from home each month, hours worked each week, and numbers of children living at home did not enter a regression equation to predict agent job satisfaction.

In studies by Kittrell and McCracken (1983) and Tritt, Lessley, and Kobbe (1991) adult agricultural agents were more satisfied with their jobs than 4-H agents. Tritt et al. (1991) also reported that Tennessee agricultural agents were more satisfied than 4-H agents with the amount of status and prestige received from their jobs, the number of hours they worked, and the flexibility of their office schedules. Van Tilburg (1987) reported that overall job satisfaction and satisfaction with pay and the work itself was lower for 4-H agents than agriculture or home economics agents in Ohio.

Satisfaction is presumed to be a function of the actual conditions of work and life and expectations of work and life (Near et al., 1983). Studies of factors influencing job satisfaction and dissatisfaction have most often focused on factors related to the work and work environment. The motivator-hygiene theory of job satisfaction (Herzberg, Mausner, Peterson, & Capwell, 1957) hypothesizes that job satisfaction and dissatisfaction are independent constructs which are each influenced by a different set of factors. In that model, job satisfaction is influenced by five motivator factors: achievement, advancement, recognition, responsibility, and the work itself. Job dissatisfaction is influenced by five hygiene factors: interpersonal relations, policy and administration, salary, supervision-technical, and working conditions. Relationships between the motivator (satisfier) and hygiene (dissatisfier) factors identified by Herzberg et al. (1957) and job satisfaction have been studied in secondary teachers of agriculture (Cano, 1990) and agriculture education faculty (B. E. Bowen, 1980; B. E. Bowen & Radhadrishna, 1991).

Moderate to high levels of job satisfaction were observed in 24 Cooperative Extension employees in Rhode Island by Mallilo (1990). A study of Extension agents in Michigan by Suvedi (1991) revealed that those agents were well-satisfied with the content and context of their jobs. Job characteristics with which the agents were most satisfied in that study were relationships with clientele, freedom to choose their own methods, the work itself, interpersonal relations, and the opportunity for creativity in the job. Items associated with the lowest amount of job satisfaction were opportunity to advance in the organization, the amount of time and work needed to do the job, the organization's internal communication, adequacy of performance evaluation, salary progress, and salary compared to those in similar fields of work. In a study of Ohio Cooperative Extension Service agents by Van Tilburg (1988), agents were moderately satisfied with their jobs. In that study, agents were most satisfied with their relationships with co-workers. Satisfaction with the the work itself and their supervision was medium to high. Satisfaction with promotion opportunities and pay was low. Overall satisfaction was positively related to both extrinsic and intrinsic reward contingencies. Job satisfaction of Iowa Extension personnel differed with the personnel's position, years of experience, age, and area of assignment, but not area of position, gender, or level of education (Kessler, 1989).

Job satisfaction has been related to Cooperative Extension personnel's occupational interests (Kittrell & McCracken, 1983); job performance (Kittrell & McCracken, 1983; Van Tilburg, 1988), professional commitment (Kemp, 1967), and decisions to change jobs (Clark, 1982; Van Tilburg, 1987). Kittrell and McCracken (1983) and Van Tilburg (1988) reported positive relationships between job satisfaction and job performance. Kemp (1967) observed a positive relationship between job satisfaction and professional commitment. The decision to change jobs was negatively related to job satisfaction (Van Tilburg, 1987). A study of reasons for resignation by Idaho Cooperative Extension field staff revealed that factors most often associated with leaving were chance for advancement and promotion, evening and weekend work, and salary (Church & Pals, 1982). Four-H and home economics agents cited evening and weekend work as a reason for leaving more often than agriculture agents. In a study of Cooperative Extension administrators (Clark, Norland, & Smith, 1991), higher levels of burnout, stress, and strain were associated with lower levels of job satisfaction. Changes in the Cooperative Extension work environment have resulted in strain leading to stress (Agnew & Foster, 1991). Many Extension personnel were asked to assume additional or different responsibilities when Extension organizations were restructured and resources were reallocated throughout the United States during the 1980's (Cooperative Extension System Strategic Planning Council, 1991). Job satisfaction of Iowa Extension personnel was lower in a 1988 study than in previous studies in 1967 and 1980 (Kessler, 1989).

Having a family may contribute to an employee's stress and job satisfaction or help to reduce them. The presence of children living at home was negatively correlated with job satisfaction of secondary agriculture teachers (Cochran, Lawrence, Odell, & Gartin, 1989), but not with job satisfaction of Louisiana Extension agents (Hebert & Kotrlik, 1990). Getting social support from family was a method Extension administrators used to cope with occupational stress before it became strain (Clark, Norland, & Smith, 1991).

PURPOSE AND OBJECTIVES

The purpose of this study was to determine if job satisfaction of educators who deliver Extension 4-H programs is influenced by their personal and family characteristics and characteristics of their positions. The objectives of this study were to determine:

1. how satisfied Extension 4-H educators are with their positions,
2. if relationships exist between job satisfaction and the personal, family, and position characteristics of professional Extension 4-H educators, and
3. if job satisfaction can be predicted from personal, family, and Extension position characteristics of Extension 4-H educators.

PROCEDURES

The descriptive correlational survey research method was used to study the target population of professional 4-H educators in the United States. A stratified random sample was drawn. Eight states, two from each of the four Agricultural Experiment Station regions, were selected. States included in the survey were Rhode Island, New Hampshire, Kentucky, Oklahoma, Wisconsin, Minnesota, Idaho, and Washington. Extension educators in these states were selected at random from the January 1990 membership of the National Association of Extension 4-H Agents. A total of 208 of 450 extension personnel in those states were surveyed to assure a sample size with a 5% margin of error with a 5% risk of drawing a nonrepresentative sample (Krejcie & Morgan, 1970).

Data were collected using a mailed questionnaire. One section was the Brayfield-Rothe Job Satisfaction Index instrument (Brayfield & Rothe, 1951) as modified by Warner (1973). The next section contained 15 statements to measure self-reported professional commitment. The statements were adapted from the questionnaire developed by Mowday, Steers, and Porter (1979). Another section contained twenty questions related to the educator's position responsibilities and personal and family characteristics. A five point Likert scale ranging from one (strongly disagree) to five (strongly agree) was used for responses related to job satisfaction and professional commitment.

Face and content validity of the survey instrument were established by a panel of experts including six faculty in the Department of Agricultural and Extension Education. Reliability was evaluated by calculating Cronbach's alpha coefficients from the sample data.

The survey instrument, a cover letter, and a stamped, self-addressed envelop were mailed on June 6, 1990. A follow-up letter and copy of the questionnaire were mailed to non-respondents at the end of three weeks. To determine if early and late respondents differed, t-tests were used to compare their responses on major variables.

ANALYSIS OF DATA

The Statistical Package for the Social Sciences (SPSS_x) was used to analyze data. Sums of the responses to the job satisfaction and professional commitment sections of the questionnaire were calculated to measure self-reported job satisfaction and professional commitment. Frequencies, means, and standard deviations were also used to analyze responses on job satisfaction and professional commitment. Pearson product moment (r) and point-biserial correlations (r_{pb})were calculated to measure relationships between variables. Comparisons between groups were made using t-tests. Stepwise regression analysis was conducted to develop an equation to predict job satisfaction.

RESULTS AND FINDINGS

One hundred sixty (77%) of the questionnaires were returned. There were 118 early responses and 42 late responses. For key variables of the study, there were no differences ($p \le .05$) between early and late respondents.

The Cronbach's alpha reliability coefficient was .86 for the job satisfaction section of the questionnaire and .86 for the section measuring self-reported professional commitment to Cooperative Extension.

The average age of the respondents was 39 years. More than half (54%) were female, and 67% were married. The highest degree earned was a master's degree or doctorate for 66% of the educators. The respondents held their highest degrees in agriculture (30%), home economics (19%), education (19%), and other majors (23%).

Over half (56%) of the educators did not have children aged 18 years or younger living in their households. Seventeen percent had one child, another 17 % had two children, and 8% had three children in their homes. None had more than five children living in their homes. Thirty-one percent of the educators had children aged 6 to 18 years, while 23% had children aged 5 or less. Over half (51%) had spouses or partners who were employed full-time, 11% had spouses or partners employed part-time, and 25% did not have spouses or partners. Only 8% of the respondents were from families in which only one parent was employed.

Eleven years was the mean length of time the educators had worked for the Cooperative Extension organization in their current state. Four-H was the primary extension program area for 89% of the educators. A single county was the geographic area of responsibility for 75% of the respondents.

The average sum of the responses to the fifteen statements that measured the self-reported professional commitment to Cooperative Extension was 54.00 ± 8.9, with values ranging between 15 and 75 possible.

Values between 14 and 70 were possible for the Brayfield-Rothe Job Satisfaction Index. The mean score for all the educators surveyed was 57.9 ± 8.9, indicating that the educators were satisfied with their jobs.

Table 1

Correlations Between Job Satisfaction and Personal, Family, and Extension Position Characteristics

Characteristic	Type of correlation	Value
Personal characteristics		
Age	r	.26**
Gender	r_{pb}	.16*
Highest level of education	r_{pb}	.16
Major	r_{pb}	-.05
Marital status	r_{pb}	-.25**
Family Characteristics		
Number of children ≤ age 18 in home	r	.06
Type of working parent family	r_{pb}	-.12
Type of child care	r_{pb}	.19
Employment of spouse	r_{pb}	.15
Residence of spouses	r_{pb}	-.14
Extension Position Characteristics		
Years employed in Cooperative Extension	r	.24**
Source of salary funding	r_{pb}	.02
Primary program area	r_{pb}	.05
Secondary program area	r_{pb}	.04
Type of geographic responsibility	r_{pb}	.05
Commitment to Cooperative Extension	r	.65**

* $p \le .05$

** $p \le .01$

Correlations between job satisfaction and personal, family, and extension position characteristics are summarized in Table 1. Job satisfaction was significantly correlated with age (r = .26), gender (r_{pb} = .16), marital status (r_{pb} = -.25), years employed with Cooperative Extension (r = .24), and commitment to Cooperative Extension (r = .65). Job satisfaction was not correlated with highest level of education completed, academic major, primary or secondary position responsibilities, source of salary funding, geographic area of responsibility, employment of spouse, number of children, type of child care, or type of working parent family.

Table 2 summarizes means, standard deviations and t-test results of 4-H educators' job satisfaction with personal characteristics. Married educators were more satisfied with their jobs than educators who were not married. Educators aged 40 and older were more satisfied with their jobs than educators aged 39 and younger. Job satisfaction was greater for female than male educators. No difference in job satisfaction was observed between educators with 1) a bachelor's degree or less and those with a graduate degree and 2) 10 years or less and 11 years or more employment with Cooperative Extension.

Table 2
Means, Standard Deviations and t-test Results of 4-H Educator's Job Satisfaction Scores With Personal Characteristics

Group	n	$\overline{X}$	SD	t	df
Marital status					
Married	105	58.7	6.5	2.13*	153
Not married	50	56.2	7.8		
Age					
39 and younger	87	57.0	6.8	-2.05*	150
40 and older	65	59.3	6.8		
Gender					
Male	72	56.7	7.1	-2.00*	154
Female	84	59.0	6.7		
Education					
Bachelor's degree or less	49	56.4	6.9	-1.88	152
Master's degree or more	105	58.7	6.9		
Extension employment					
10 years and less	83	57.2	7.2	-1.51	154
11 years and more	73	58.8	6.7		

* $p \leq .05$.

Table 3
Stepwise Regression of Job Satisfaction on Professional Commitment, Age, and Gender.

Variable	b	Beta	Adj. R^2	Adj. R^2 Change	t	p
Commitment	.471	.605	.396	.396	9.116	<.001
Age	.119	.164	.413	.017	2.460	<.05
Gender	1.821	.133	.427	.014	2.006	<.05
(Constant)	25.268				7.269	<.001

Final model: Adj. R^2 = .427; F (3, 130) = 34.00; $p \leq .01$

Table 3 presents the stepwise regression model constructed to predict job satisfaction from the characteristics of the 4-H educators. Forty percent of the variance in job satisfaction was explained by the educators' professional commitment to Cooperative Extension . Additional variability was explained by the educators' age and gender. Variables which did not enter the equation were educator's number of children under age 18, employment of spouse, highest degree completed, major, race, marital status, years employed with Cooperative Extension, primary program area, and geographic area of position.

CONCLUSIONS AND RECOMMENDATIONS

Extension 4-H educators were satisfied with their jobs. Their job satisfaction was positively correlated with their 1) degree of commitment to Cooperative Extension, 2) number of years employed with Cooperative Extension, 3) age, and 4) gender. Kemp (1967) also reported a positive relationship between job satisfaction and professional commitment. A low negative correlation was found between job satisfaction and marital status. Job satisfaction was not correlated with family characteristics (employment of spouse, number of children, and type of child care) or with position characteristics (program area, geographic area of responsibility, and source of salary funding).

Although family responsibilities compete for time with work responsibilities, family conditions did not have a major impact on the job satisfaction of extension 4-H educators. Forty-three percent of the variance in the 4-H professionals' job satisfaction could be explained by their professional commitment, age, and gender. Additional study of professional commitment and how it influences job satisfaction is recommended. The high proportion of variability in job satisfaction not explained by the regression model suggests that attention should continue to be given to other factors associated with work and the working environment which have previously been shown to influence job satisfaction.

Job satisfaction has been associated with organizational commitment, job turnover, and performance. Near et al. (1983) suggested that satisfaction is a function of actual conditions and expectations of work and life. To prevent a decline in the job satisfaction of their personnel, Cooperative Extension organizations should place continued emphasis on factors that have been found to be correlated with job satisfaction (e. g., the work itself and opportunities for recognition and advancement). Potentially dissatisfying aspects of the job, including amounts of travel and weekend and evening work expected, should be clearly communicated to employees at the time they are hired, and attempts should be made to control their negative impact upon job satisfaction. In-service training about time and stress management may help Extension employees cope with potentially dissatisfying aspects of their work.

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RELATIONSHIPS BETWEEN PERSONAL, FAMILY, AND EXTENSION POSITION CHARACTERISTICS AND JOB SATISFACTION OR EXTENSION 4-H EDUCATORS

A Critique

J. Robert Warmbrod, Ohio State University--Discussant

A major strength of the paper is the theoretical and empirical rationale for the research that is synthesized in the first two pages. The writings cited are germane to the research; the number of citations is impressive. This major strength is precursory to a weakness of the paper.

The researchers review theoretical and empirical literature from which clear-cut research hypotheses could be derived regarding an investigation of how the job satisfaction of 4-H educators is influenced by the characteristics of their positions and their personal and family characteristics. The theoretical and research base provides a rationale for research hypotheses to guide the research in contrast to an approach that questions whether relationships exist between job satisfaction and personal, family, and position characteristics. Theoretically and empirically based research hypotheses provide the framework for analyzing the data, interpreting the findings, and framing conclusions and recommendations.

Explicit research hypotheses provide a rationale for selecting analysis procedures (bivariate versus multivariate), for interpreting findings, and for enhancing the cumulative contribution of the findings to the theoretical and empirical knowledge base of the study. For example, which of two findings reported in the paper is more defensible? The bivariate analyses reported in Tables 1 and 2 indicate that age, marital status, gender, years employed in Cooperative Extension, and professional commitment are related to job satisfaction. The stepwise regression analysis indicates that only age, gender, and commitment are important predictors of job satisfaction. Which is more appropriate? Clearly defined research hypotheses also suggest a purposeful entry (hierarchical or simultaneous) of independent variables into the regression equation in contrast to an exploratory orientation, which is the case of stepwise entry.

I raise three questions regarding methodological concerns. (1) Specifically, how does the "sample size with a 5% margin of error with a risk of 5% of drawing a non-representative sample" apply in this research? What population parameters are being estimated? (2) What is the rationale for comparing early and late respondents and how does this analysis strengthen the external validity of the research? (3) How can point-biserial coefficients and partial regression coefficients reported for nominal variables (example, gender) be interpreted properly when the coding used for the nominal variables is not made explicit?

VIEWS AND CHARACTERISTICS OF THE MEMBERSHIP IN THE NATIONAL YOUNG FARMER EDUCATIONAL ASSOCIATION

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INTRODUCTION

Background

The National Young Farmer Educational Association, Inc. (NYFEA) is the vocational student organization for those adults enrolled in agriculture classes, usually through the local vocational agriculture program (Sprick, 1989). Young Farmer chapters at the local level have been in existence since the 1940's and some state associations can be traced back to the mid-1950's (Schwarm, 1983). It wasn't until July 1982, however, that a national organization was established. The NYFEA was incorporated September 17, 1982, as a non-profit, non-political educational association for agriculture (Spick, 1989). Since that time the NYFEA has developed programs and activities based on assumptions about the membership.

Need for Adult Education in Agriculture. It wasn't until 1920 that the urban population in the United States exceeded the rural population (Grattan, 1971). Citing the 1920 census figures Schmidt (1928) reported that more than six million adult farmers were over twenty-one years of age in the United States and that the big majority of them had received little or no technical instruction for farming. The point that Schmidt made was that a definite need existed for adult eduction in agriculture. "By 1989, only 4.8 million people of all ages remained on farms" (Beale, 1990, p. 6). If one added the number of people who lived off the farm they operated, the number increased to 5.3 million, or just 2 percent of the total population in the United States (Beale, 1990, p. 6). According to the *1987 Census of Agriculture: Alas of the United States* (1990) only 34% of the farmers have completed more than 12 years of school. This fact would indicate that a definite need still exists for adult education in agriculture.

Miller (1987) surveyed farmers in two counties in Ohio and concluded, "A large majority of the farmers and agribusiness owners/managers have a felt need for adult education programs in agriculture" (p. 11). Some of the reasons the respondents felt a need for educational programs included keeping up with complex changes and the fact that one is never to old to learn (Miller, 1987).

In a national study of adult education in agriculture Birkenholz (1990) concluded that "adult education is an important component of agricultural education" (p. 14). Another aspect of this study asked respondents, who consisted of state supervisors and head agricultural teacher educators, if it would be a positive addition for their state to have an organized affiliate of the National Young Farmer Educational Association. Birkenholz (1990) concluded that "Each state should be encouraged to organize an affiliate of the National Young Farmer Educational Association" (p. 14).

National Young Farmer Educational Association. The concept of a society or club for farmers is not new. Stimson (1942) noted that nearly 100 farmers' clubs were organized in Minnesota during 1908 and 1909. "The aims of the movement were both educational and social" (Stimson, 1942, p. 236). What makes the NYFEA unique from previous clubs or societies is that it has been "officially recognized as a vocational student organization by the United States Department of Education" (Staff, 1991, p. 2).

Objectives and Purposes of the Association. The main purpose of the NYFEA is education. The objectives and purposes are:

(1) To assist young farmers and ranchers through organized, systematic, educational programs to become and remain established in farming, ranching or agribusiness;
(2) To assist in developing and utilizing resources available for improving economic status and developing family relationships;
(3) To cooperate with all agencies and organizations whose objectives are the improvement of the economic, educational and social conditions of rural live;
(4) To assist young farmers and ranchers in developing leadership and communication skills;
(5) To provide group identity and unity;
(6) To promote the Association as an integral part of the instructional programs of agricultural education offered by departments of public instruction; and
(7) To improve rural-urban relations and urban consumers' understanding of agricultural issues (Staff, 1991, p. 49).

In order for the NYFEA to accomplish these objectives its leaders must understand the demographic characteristics of the membership. It was for this reason the NYFEA Board authorized this study.

The literature on adult education in agriculture is very plentiful but little has been written about the NYFEA. Much of the research about the NYFEA concentrated on instructors and local or state administrators. The review of literature revealed this was the first scientific national study of the NYFEA membership. This information will be valuable for planning the future of the NYFEA and serve as baseline data for future studies.

Statement of the Problem

In the past little was known about the NYFEA membership. Many assumptions have been made about the characteristics of the membership based on studies of young farmer advisors, state supervisors for agricultural education, and college personnel. Only one demographic study was conducted which surveyed the members and that study was not conducted in a scientific manner. In order for the NYFEA to continue to meet the needs of the membership, the characteristics of the members and their needs must be known.

PURPOSE AND OBJECTIVES

The primary purpose of this study was to investigate and analyze the demographic characteristics of the membership in the NYFEA, including the opinions of the membership toward local, state, and national programmatic issues.

Objectives of the Study

In order to accomplish the purpose of this study, the following specific objectives were developed. To:

(1) Develop a demographic profile of NYFEA members;
(2) Determine the perceived benefits of membership in the NYFEA;
(3) Examine the degree of involvement in production agriculture/agribusiness of NYFEA members;
(4) Identify future agricultural business plans of NYFEA members;
(5) Examine NYFEA member attitudes toward programmatic issues.

PROCEDURES

Design

The researchers determined the most appropriate method of research for this study would be descriptive research. According to Sax (1988) "Research involving the collection of data for the purpose of describing conditions as they exist is called descriptive or status research" (p. 288). Descriptive analyses were used to examine population data. Inferential and comparative analyses were used to relate data based on demographic characteristics to the population and response variables.

Population and Sample

The population was all the members of the NYFEA in the United States in 1991-1992. Wayne Sprick, the executive director of the NYFEA, projected this number to be approximately 17,750 members in 21 states. Using a formula from *A Handbook of Survey Research* (Kingery, et.al., 1989), a random sample of 376 members from 20 states was selected for the study.

Instrumentation and Data Collection

It was determined that a mailed questionnaire would be most effective in time and economy for this study. Development of the questionnaire began in July of 1991. In October of 1991, the instrument draft was field tested with the NYFEA Board of Directors, NYFEA committee chairpersons, and the Georgia YFA Executive committee to improve readability and clarity.

Reliability analysis of the field test revealed a Cronbach Alpha of .88 for the raw variables and .87 for the standardized variables. The questionnaires were mailed out to the NYFEA members included in the sample on October 30, 1991. A second mailing was made to non-respondents on January 10, 1992. A third mailing was sent to non-respondents on February 7, 1992. On February 27, 1992 a 10% random sample of non-respondents was selected for a telephone follow-up to obtain general information for comparison with respondents. The telephone follow-up was completed on March 7, 1992.

ANALYSIS OF DATA

Nominal, ordinal, interval, and ratio data were collected and analyzed using descriptive and inferential statistics. Data were analyzed in several demographic subgroups to identify possible relationships. Scientific random sampling allowed generalizability to the entire population.

RESULTS

The findings presented in this paper are based on the responses of 147 NYFEA members from 18 states who returned questionnaires and 23 NYFEA members who were included in the telephone follow-up. There were no significant demographic differences on four selected variables so the data was pooled. However, some differences between the two groups were observed concerning their views of programs and services. These differences were noted in Table 1 and in the discussion.

Demographic Data

The average age of the respondents was 40.2 years. Eighty-nine percent of the respondents were male. The largest majority were married, 84.4%, with 1.4 children living at home. Those who were never married accounted for 11.3% of the respondents while 3.1% indicated they were separated, widowed or divorced. A large majority of the respondents (95.3%) graduated from high school. The average years of formal education for all respondents was 13.6 years with 29.3% indicating they possessed a bachelors, masters, or doctorate degree. Nearly two-thirds (62.5%) of the NYFEA respondents participated in high school agricultural education classes ($\underline{M}$ = 3.7 years) and FFA ($\underline{M}$ = 4.0 years), while 40.6% indicated they were 4-H members ($\underline{M}$ = 6.0 years). When asked about participation in other organizations respondents ranked church involvement first (70.6%) followed by involvement in various farm organizations (53.8%) and livestock associations (38.1%).

Information about Involvement in the YFEA

The average length of membership in the NYFEA by the respondents was 9.6 years. When asked why they joined/enrolled in the program, 51.3% indicated it was for the educational/technical training. Remarkably, the second most common reason to join was the invitation of other members (44.4%) with social activities ranking third (35.6%). Only 6.3% of the respondents signified they were life members of the NYFEA but 13.8% of the respondents indicated they would pay $100 to become a life member. The major reason listed by respondents for not becoming a life member was it was too expensive.

Nearly one-half (43.1%) of the respondents denoted the most important benefit received from membership in the local young farmer chapter was education/training. Contacts with other farmers was ranked second (16.3%). Education/training and young farmer programs/activities were the most important benefits received from membership in the state young farmer organization according to 13.8% of the respondents. Also, on the state level, 13.1% of the respondents signified contacts with other farmers as most important. On the national level, 13.1% of the respondents indicated the National Institute was the most important benefit with National Young Farmer publications ranking second (8.1%).

The respondents were asked to indicate the Young Farmer programs/activities they participated in at the local, state and national level. On the local level, 38.1% indicated they participated in agricultural tours. On the state level, nearly one-third (30.6%) of the respondents indicated they participated in agricultural tours and 28.8% attended the state association convention. On the national level, 13.1% of the respondents indicated they had participated in the National Institute.

Involvement in production agriculture

More than three-fourths of the respondents (78.8%) classified their operations as production agriculture. Sole proprietorship was the most common type of operation indicated by 56.9% of the respondents. Roughly two-thirds of the respondents (65%) lived on the farm they operated; 21.4 years was the average length of time on their present farm. More than one-third (35%) of the respondents indicated they worked off the farm full-time (22.5%) or part-time (12.5%). More than one third (38.7%) of the spouses also worked off the farm full-time (18.1%) or part-time (20.6%). The income generated from off-farm employment was considered necessary to continue farming by 35.6% of the respondents.

The average estimated value of land and buildings for the 106 respondents engaged in production agriculture was computed at $342,617. The average farm/ranch size for 117 respondents was 933 acres. Most of that land (54.2%) was privately owned by the respondent with 45.8% rented and 19.1% of the acreage operated in partnership. Cropland accounted for approximately 55% of the acreage with 37% devoted to pasture/rangeland. Timberland accounted for 5.8% of the acreage with 2.2% being declared unusable because of roads, ponds, house lot, etc. Livestock and poultry accounted for 66.7% of the income for 87 respondents. The most frequently reported type of livestock raised was beef cattle (n=67) followed by swine production (n=29) and dairy production (n=19). Crops accounted for 57.1% of the income for 67 respondents. The most frequently reported crop was corn for grain or seed (n=69) followed by hay (n=67), wheat for grain (n=51), and soybeans for beans (n=49).

Future plans

The respondents were asked to indicate their plans for the next 10 years in specified areas. More than forty percent (41.9) of the respondents indicated they planned to put up new buildings. Expansion of livestock enterprises was designated as a priority for 39.4% of the respondents. Buying or renting more land in the next 10 years was cited by 38.1% of the respondents. Expanding crop enterprises was listed as a preference by 28.8%.

Views of programmatic issues

Respondents used a five point Likert-type scale to indicate the level of importance they would place on selected purposes of the local Young Farmer program. Technical education/training was rated highest (M= 4.3) followed by serving as a local support group for farmers (M= 3.9), supporting the local FFA chapter (M= 3.8), farm management/record keeping (M= 3.7), and social activities (M= 3.2).

Respondents were asked to indicate what value they would place on NYFEA membership as it related to their operation. A five point Likert-type scale was used to assess this value with one (1) being "no value" and five (5) being "great value". The mean score computed from the respondents was M= 3.1 which translated to "some value".

More than half (52.5%) of the respondents indicated they had the opportunity for input into the curriculum through class discussions/consensus. Only 10% indicated that the instructor/advisor determined the curriculum. The three instructional areas which received the highest interest rating on a five point scale were marketing agricultural crops for maximum profit (M= 4.26), farm management (M= 4.03) and latest farming technology (M= 4.0). From the questionnaires it was determined that respondents had an average of 11.6 meetings per year which averaged 2.2 hours in length.

Views of NYFEA Programs and Services

Table 1
Mean Respondent Ratings of Programs and Services Offered by NYFEA (N = 160)

	Current Impact 1= low 2= medium 3= high	Future Emphasis 1= reduce 2= same 3= expand
The spokesperson for agriculture program	2.06*	2.53
The farm & ranch management program	2.06*	2.44*
State grants for innovative programs	1.86	2.40*
The international exchange program	1.63	2.19
Sending a delegation to the World Congress of Young Farmers	1.66	2.21
Program/Service Cooperating with Farm Records Inc. on the Infield Today record keeping system	1.73	2.24
Sending a national officer representative to state association conventions	2.03*	2.32
The annual National Institute, rotated among the states	2.21	2.35
Providing members and friends with the National Young Farmer newsletter three times per year	2.06*	2.29
Reporter of the year award	1.97	2.20
National Young Farmer Directory to national leaders in Ag Ed and state officers	1.96	2.28
Update Newsletter for state leaders, local advisors and agribusiness	2.15	2.37
Coordinating the European Exchange Mission	1.50	1.90*
Presenting the Outstanding YF Advisor award	2.14	2.33

*Significant differences between early and late respondents at the .05 level.

Table 1 displays the views respondents held toward programs and services offered by the National Young Farmer Educational Association. The data revealed that significant differences existed between early and late respondents regarding the current impact of four program areas. In three of the program areas the late respondents had a mean significantly lower than the early respondents. The late respondents had a mean significantly higher mean when compared to early respondents concerning the current impact of sending a national officer representative to sate association meetings.

Of the remaining program/services, the data revealed the National Institute was perceived as having the highest current impact (M=2.21). The Update Newsletter (M=2.15) and presenting the Outstanding YF Advisor award (M=2.14) also had means greater than 2. All three of these programs/services were perceived as having a medium impact on state and local YF programs.

The early respondents had significantly lower mean scores relating to the recommended future emphasis for three programs/services. Respondents indicated the other programs/services should have the same or expanded emphasis in the future. The spokesperson for agriculture program (M=2.53) had the highest mean score indicating a desire on the part of respondents to expand future emphasis on this program.

CONCLUSIONS

When the data were compared to the 1987 Census of Agriculture: Agricultural Atlas of the United States (1990) the following observations were made:

-NYFEA members were approximately 12 years younger than the national average for farmers.

-They operated farms more than twice the size of the national average with a larger investment in land and buildings.

-They had an average value of agricultural products sold more than twice the national average.

-NYFEA members had a higher level of educational attainment when compared to the average American farmer.

The main reason farmers joined and continued their membership on the local level was for the education and training. The respondents desired education most in marketing agricultural crops, farm management and latest farming technology. These findings are consistent with the findings of Chizari and Taylor (1991).

Respondents also perceived the programs and services offered by the NYFEA as having only a low to medium impact on state and local programs. However, members believed the future emphasis should remain the same or be expanded in all program/service areas. Respondent comments suggest that improved communications about the programs and services offered by the NYFEA was also needed.

RECOMMENDATIONS

To increase membership in the NYFEA, local programs need to emphasize the educational/training benefits associated with the program. Current members can be very instrumental in enrolling new members simply by inviting non-members to the meetings. The educational needs of the members should be assessed on the local level and programs planned accordingly. The data concerning programs and services offered by the NYFEA would indicate that the national organization should find ways to expand most programs in the future. Future studies should be conducted periodically at the state and national levels to monitor NYFEA membership demographics and the membership views towards programs and services.

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VIEWS AND CHARACTERISTICS OF THE MEMBERSHIP IN THE NATIONAL YOUNG FARMER EDUCATIONAL ASSOCIATION

A Critique

J. Robert Warmbrod, Ohio State University--Discussant

The strengths of the paper are (1) a clearly stated objective for the inquiry--describe the demographic characteristics of membership of the National Young Farmer Education Association, including the opinions of members about local, state and national programmatic issues, (2) a straight-forward rationale for the study--to accomplish its objectives the organization must know the demographic characteristics of its members, and (3) within the page limitations for the paper, an understandable summary of the findings of the study, particularly a comparison of the characteristics of the farmers in the sample with demographic characteristics of farmers in the U.S. published in the 1987 Census of Agriculture.

The authors make the point that the study is scientific, stating "scientific random sampling allowed generalizability to the entire population." This laudable goal prompts several questions.

What factors were used in calculating sample size? The sample size was calculated for estimating what population parameters? What margins of error accompany the desired sample size? What margins of error accompany the actual sample of respondents?

How was the sample drawn? Was "state" a primary sampling unit in a multi-stage sampling strategy? How was the frame of members established from which the sample was drawn?

Is a 10% random sample of non-respondents adequate for assessing whether inferences to the population based on data from respondents are valid generalizations? How do the reported differences between respondents and non-respondents qualify the generalizability of the findings?

Data are summarized for what appears to be individual items on the questionnaire. Cronbach's alpha, reported as the index of reliability of measurement, pertains to summated scores for groups of items. How is Cronbach's alpha applicable to the measurement of individual items? What are "raw" variables on the questionnaire? What are "standardized" variables?

The methodology described in the paper generally indicates that the authors did the "right things"; however, there is not specific or sufficient information in the paper regarding questions such as the above to appraise the extent to which the goal of scientific inquiry has been achieved.

DID THE VALUE OF EDUCATION IN AGRICULTURE GO UP TODAY?

Edgar Persons
University of Minnesota

In today's society, marked by shrinking public budgets and a new awareness of the need to obtain the highest value for the public resources we spend, the theme of this NAERM session is most fitting. Did we add value to agricultural education by what we have labored so long and hard to produce and report? While it is a simple question, it is perhaps one of the most difficult questions we will encounter in our professional careers. My task is not to answer the question, since I am no more knowledgeable than you about the correct response, but rather to develop a framework with which the answer to the question can be pondered.

THE VALUE ADDED CONCEPT

If there were ever a group who should understand the concept of "value added", it is a group whose professional career and life long work is associated with agriculture. It is in agriculture that the concept of value added is so easy to recognize. It begins on the farm or ranch where the inputs of land, labor , capital and management are converted to useful products that have utility in the market place and can be exchanged with others for goods and services that also have utility. Farmers and ranchers usually take cash in lieu of bartered goods and services. The objective of this exercise by the farmer or rancher is to convert resources that have little utility to others into things that are barterable or saleable. The ultimate goal is to produce goods and services that have greater value than the value of the resources used to produce them; thus the concept, " added value".

We can follow this concept all the way from the farm field to our own dining table, recognizing that any process along the way that does not add value to the product will for sure be temporary. Resources must add value or the resources will be ultimately diverted to some alternative use where value added is apparent.

It is easy to extend the concept of added value to the kind of educational exercises we have heard reported here today. It is easy to ask the same questions. Did the process, in this case research, add value? Or perhaps more important, did the process add more value than it cost? These are tough questions. We don't always know what the answer is and we frequently don't know how to find out.

IMPROVING HUMAN CAPITAL

I am going to make the assumption that in the long run, the research that was reported here today had a singular global purpose: to improve the education of youth and adults. The measure of whether or not we added value by our efforts, can be related to the notion of improved human capital. Theadore Schultz, the famed economist, was recognized for his theories of human capital development. Much of his work centered on the idea that human capital had value, and that the value of the capital could be influenced by education. The more and better the educational input, the more valuable was the human capital. Schultz estimated the rates of return on investments in human capital through education. He estimated that elementary education returns about 35% on the investments made. Secondary education returns about 10% and college preparation returns 11%. Schultz made no attempt to divide the question into the value (or return) to expect on research as opposed to instruction and the other component parts of the educational enterprise. His work called attention to the idea that education had measurable value and that the concept of value added could be applied to a diverse enterprise like education as well as to the more confined enterprises like manufacturing and agricultural pursuits.

Davie, operating on the same premise that eduction had a desirable lifetime effect on earnings, added another dimension to the argument for improving human capital by examining the cost and benefits of additional schooling. Davie was concerned not only that education added value, but that the costs of obtaining it were less than the benefits. Davie introduced the idea of discounting benefits to current values recognizing that benefits of education engaged in today may not be fully manifested until some future time. This concept of thinking about future benefit is an important one when we consider the question of the added value of educational research. There is high probability that the benefits will not be immediately apparent, and when they do begin to accrue, they will accrue over a long period of time. Some understanding of the concept of "present value" will be useful in assisting us in choosing from among alternative research choices where the immediacy of payoff is dissimilar.

Personally, I cannot cite recent educational literature that may attempt to verify the work of Schultz. Nor am I familiar with research that attempts to place a value on the contributions of educational research to the improvement of human capital. If there are those who are, I hope that you will enlighten us during the discussion following this presentation. I have, however, seen the reports in my state of the agricultural research community where they have attempted to verify the effects that agricultural research has had on the value of farm productivity. Perhaps you have seen similar reports in your own localities. It is perhaps less difficult to trace the effects of research on cows, sows, plows and things that grow in the ground than it is to trace the effects of research on the implementation of educational practice.

MEASURING THE EDUCATIONAL BENEFIT

It could well be that we don't know if we have added value by the research we have completed and reported, because we don't know how to measure the benefit. If,however, we keep in mind that the purpose of what we do is to improve the educational enterprise, then we may gain some insight as to how benefit could be measured, even if to date we have not attempted to do so. It would be a good exercise to revisit each of the research papers presented here today and ask a simple question; "So what?" How do you anticipate educational practice and the educational enterprise would or could be improved because of the information you have discovered and reported?

I read each of the papers that were presented here today looking for two things: 1) What the author or authors claimed the significance of the paper to be as it related to educational practice or knowledge about the profession and 2) The conclusions or recommendations the authors drew that had to do with improving the educational enterprise.

Every researcher who delivered a paper here today should re-examine his or her work to determine if these points were adequately addressed. My personal assessment is that , with a few exceptions, they were not. Few of the papers stated the effect the research would or could have on education. When benefits were addressed, they were aimed more at process than at the ultimate value in changing practice. Authors used terms like "beneficial" (In what way and for whom?), "learn more" (What and in what way does it improve education?) , "identify relationships" (How are the relationships related to improvements in the educational enterprise?), and other broad terms and concepts that did not describe the ultimate benefit the research may have.

There were some exceptions. I recall specifically the benefit described in one of the Texas papers on safety (Lawver,1992). The author said " The ultimate benefit of this research and subsequent efforts will be a safer learning environment for children enrolled in agricultural science programs in Texas". He went on to say, "If like Virginia teachers, Texas teachers average five accidents per year we can conservatively estimate a cost of $711,500 if those accidents average $100 each". The point is that the author had in mind what the benefit of the research would be and even was willing to hazard a guess as to what the economic value of the accidents the program was designed to prevent might be, based upon research done in other agricultural programs.

Perhaps the fault is ours- yours and mine- and not the fault of the authors of the studies reviewed here today. If you examined the outline suggested for reporting the studies, you would find that making an assessment of how the study would impact upon educational practice was not highlighted. I suggest we change the outline in subsequent sessions of NAERM. It should be more evident that the author is encouraged to assess the value the research has added to education, or at least has been stimulated to think about the significance of his/her research in the broader scheme of educational practice. We should recognize that by doing so, we will expect some papers to fail the test.

MEASURING THE COSTS

It would be nice, at least once in awhile, to get some notion of what research costs. It does little good to get really excited about the benefit side of the equation if we ignore the costs. The concept of "value added" assumes that the costs have been covered and usually that some value over and above the costs has been produced; the concept of profit! But before we get too enthused about profit, we had better be willing to calculate costs. I wonder if anyone in this audience could tell me what it cost to conduct the research they reported on here today? I would not be surprised if you could not, since we rarely examine the cost side of the equation either. When we do we are more likely to add up the out- of-pocket costs such as postage, paper and pencils and forget the real costs of professional time and the opportunity costs of engaging in research as opposed to engaging in some alternative benefit producing educational endeavor.

Just as I would suggest we need to examine the potential benefit of the research activity, we need to examine the costs. Perhaps if we developed a proforma budget for every research activity we contemplated,we would become more adept at determining actual research costs and would begin to think of the costs in relationship to potential benefits.

Those of you who engage in grant writing are used to establishing budgets, (even if they sometimes contain a fair amount of smoke!).If you are just starting in this business, I suggest you get used to the idea of determining the potential costs of the research you intend to conduct, including the value of your time in its most productive alternative use.--especially when you are going to conduct the study without the benefit of external funds that augment the meager resources most of us have to work with in our departments. Making the most of our resources is an important responsibility. There is some research that will have a higher pay-off than other research. We have to be able to cost it out.

THE HIGH COST OF IGNORANCE

You should not construe what I have said about the high value of knowing about benefits and costs to imply that we should instead choose ignorance if it is not possible to precisely define the benefits and costs . Ignorance is our most expensive condition! We need to recognize the power of knowledge, even when it is imperfect, in improving the human circumstance. All the more reason to focus on the benefits and the significance of our research! Have we added to knowledge or are we still as ignorant as we were before?

We don't know what the cost of being uninformed is. What is the cost, for example, of using teaching method A when students learn best by using teaching methods B,C,and D? What is the cost of requiring study in disciplines A,B and C when the goals of society are best met by requiring study in disciplines A,B and D? We could go on forever asking the simple question of" What is the cost of not knowing --------?". All we know is that the cost can be high.

FOCUSING ON THE THINGS WE CAN INFLUENCE

I am always amazed at our propensity to be drawn to the things we cannot change or influence. We do it all the time! I am as guilty as anyone else in being almost mesmerized by the ability to define our samples and sub-samples and research respondents in the finest detail of demographic and physical characteristics. It is as if we possessed some magical power to make old people young, short people tall, city dwellers country dwellers, males females and smart people dumb. While these demographic and physical characteristics help to define the group or groups with which we are working, little is to be gained by testing if there are significant differences between or among groups in these characteristics when we have not thought about the changes in practice that we would recommend should differences be found. Just for arguments sake say you found a significant difference in age between two comparison groups. It adds little to the value of the research to simply point out that there is a significant difference. What is the consequence of the difference? Does it translate into a different teaching/learning system? Does is suggest some modification in treatment to accommodate the discovered difference? Does it provide clues for the development and delivery of a certain kind of curriculum? More often than not, there is no suggestion of how to differentiate the treatment because we are now knowledgeable about the group age. We fail frequently to answer the "So What?" question after determining that differences exist.

I suspect we will continue to define and test differences in groups and individuals using demographic and physical characteristics. But we might add more value to the research if we focused more attention on the things we could change or influence and spent less time on those attributes we cannot manage. I challenge each of us to ask the " So What?" question every time we report a fact or finding. If we cannot explain to others why knowing a fact or finding is important, then maybe it isn't.

FOCUSING ON A THEME

The value of our research in Agricultural Education may be seriously diminished by our inability to establish a programmatic agenda for research. If you examine the papers delivered at this conference, you will conclude that we are not very focused on the kind of things we might consider to be of high importance to the profession.

Of the forty-four papers presented at this conference, 13 of them had no relationship to any other paper presented. To me that suggests that as a profession we have not been very clear on defining the major themes around which our research should focus. If we are to develop a data base on an issue or topic that is comprehensive enough so that the knowledge we gain may be forged into some desirable changes in educational practice , we need to pay more attention to a thematic approach to research.

To illustrate, examine the themes for this conference and the number of papers that were related to the theme. You would observe the following:

Theme	Number of Papers
Middle School	4
Safety	4
Student achievement	4
Agriscience	4
Extension education	3
Technology	3
Job satisfaction	3
Student teaching	2
First year teachers	2
SAE	2
Miscellaneous	13

I recognize that individual researchers may have developed themes around which their research is focused. But we usually have the privilege of presenting research studies only one at a time. The program or theme you may be developing is not very evident at a conference like this. I suggest, however, that in matters that are really important to the agricultural education enterprise, we cannot wait out your lifetime of research to put it all together into something that will affect educational practice. We need to work together to compile a knowledge base that will provide more immediate guidance. We need partners. We need a "grand plan" for some topics so we can divide up the tasks, avoid needless repetition of things that do not need to be replicated, and shorten the time it takes to have viable recommendations for action.

It would be refreshing to have a matrix of needed research studies identified to address a particular problem and find that there was a researcher or team working on each cell of the matrix. At this very conference next year we could hear how the pieces of the puzzle have been put into place so a picture of educational improvement has emerged!

Perhaps what we need to do is to establish more cooperating working groups like the North Central Regional NCR 158 committee on research on adult education. One of the most important accomplishments of that group of researchers was to develop a vision of what research needs to be done in adult education. The themes and sub-themes that are part of the visionary statement developed by that committee serve as the organizers around which adult education in agriculture researchers can focus. At this AVA conference there is another group that will attempt to organize a similar committee to focus their attention on the broad topic of rural education. Their first task will no doubt deal with the establishment of an agenda around which research can be organized.
Others should examine this or similar mechanisms to facilitate the establishment of working groups who have high interest is specific, significant, educational problems. Programs of research, not episodes, will advance our knowledge more rapidly.

GIVING RESEARCH VALUE

Stimulating agricultural research to be more programmatic rather than episodic would be a great step forward, but it will not be enough. We need the skills of analysts and synthesizers to translate research studies into programs of action. We need to start reporting some of the analysis and synthesis of research at conferences such as this so we can begin to appreciate how the pieces of the puzzle fit into the plans for informing practice.We need to accept that activity as a legitimate contribution and responsibility for the research community. It would be my suspicion that had such a paper been proposed for this forum, it would have been turned down. If I am correct in that assumption, then we need to change our ways. How will we be able to assess the value we are adding to agricultural education if we cannot synthesize the related research studies into plans of action that can be publicly aired and vigorously debated?

WORKING THE CUTTING EDGE

Doing something new and different can be a dangerous move. It is more comfortable and safer to focus our research on the tried and proven aspects of education where there is less probability that we might fail to be able to report a favorable finding. I suggest we begin to live more dangerously. We have to work the cutting edge if we are to influence practice. You might examine each of the studies presented here today and ask " Was this study on the cutting edge?" Was it addressing new problems or seeking answers to new questions that would shape education in the decades ahead? I think you could identify several of the themes of this conference as being on, or at least very close, to the cutting edge. The focus on agriscience is no doubt a response to the questions of what the character of the agricultural education program at the secondary level should be like. Attention to technology follows the notion that the delivery of education may need to change and the "New Schools" of America will depend a great deal on our ability to maximize our use of appropriate technology in the teaching/learning paradigm. These "what" and "how" questions are important ones for the decades ahead.

Equally pertinent is attention to "who". You have heard four studies of agricultural instruction in the middle school. That is certainly a shift in our identification of a target audience. It suggests to me that our own effort at the University of Minnesota under the direction of Dr. Roland Peterson, to establish a middle school in our own Vocational Technical Education building is timely. (It also raises an interesting question of what a Minneapolis middle school is doing in St. Paul, but that's another story!)

If you have not faced by now, you soon will face the dilemma of rising entrance standards in colleges and universities. Most of us have faced that fight unarmed. Some of the studies at this conference that addressed the measurement of student achievement will provide ammunition to carry forward the argument that success in college and success in life is not necessarily tied to completion of courses in subjects X,Y, and Z. This is a cutting edge concern that some of you have chosen to address.

There are other studies from this conference that would be considered to be on the agricultural education research frontier. You may have your own notion of what they are.

My only suggestion is that we won't make many points in the research community or we won't be able to talk very much about the value we have added if we do not devote a goodly share of our effort to the problems and questions that are on the cutting edge of knowledge and practice.

ADDING IT UP

If you have paid any attention to my rambling this afternoon you may have caught several key points I was trying to convey. To make some sense from this activity, and to aid in organizing what you may remember from this discourse, let me summarize in a few brief statements how I think we may respond to the question " Did the value of education in agriculture go up today?"

Here are some key points to ponder:

- Understand the concept of value added

In simple terms, education should be better off in some measurable way than it was before we engaged in and reported our research.

- Be prepared to define the benefits

Improving process or just "Knowing" has to be translated into some improvement in educational practice and the ultimate improvement of what happens to youth and adults when they engage in what we term education.

- Calculate the costs

The whole concept of value added has to take into account a positive benefit cost benefit ratio. Calculating costs is an important part of the benefit cost formula. Considering opportunity costs of professional time is going to take a great deal of serious thought.

- Focus on the elements we can influence.

Unless you possess some magical power to change the unchangeable, lets direct our attention to those things we can influence. When we must deal with attributes we cannot change, then be direct in telling us how educational practice must be modified to accommodate the unchangeable differences you encountered.

- Make research in agricultural education more programmatic.

To really have a collective research enterprise that has value, we must present a program of research that provides a complete enough picture to be woven into a plan of action and implementation. That is going to take many of us working on the same problems or questions in some coordinated way. We cannot wait the lifetime it will take for individual researchers to solve all of the problems of their personal research puzzle. We must collaborate.

- We need to invite the analysts and synthesizers to our party.

Some people have a special skill of putting the pieces from a variety of research efforts together into a plan that can be aired and debated. They are valuable parts of the research community. We need to invite them to participate with us, if we are not they, and we need to recognize the value of their contributions.

- We need to risk being on the cutting edge

If fools rush in where angles fear to tread, then on occasion we have to be fools. The most valuable research will be that which points a new way. It will be on the cutting edge-- a dangerous and risky place to operate, but an essential place if we are to add value to agricultural education. The challenge will be to balance the research that charts the unknown with the research that reinforces and solidifies our current knowledge of the educational enterprise.

A FINAL THOUGHT

I have not answered the question to which I was assigned. I can't. I don't have the knowledge or wisdom it takes to answer it. But I can think about it. I'm asking you to think about it too. Each and every time you contemplate a new research effort, ask yourself the simple question," So what?". Eventually we will begin to shape answers with which our publics, peers and colleagues will be impressed, and which will insure that the vital resources needed to continue research in educational endeavors will be made available.

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Additional Papers

Accepted for Publication in the Proceedings

EDUCATIONAL INSTRUCTION VIA INTERACTIVE VIDEO NETWORK

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INTRODUCTION

Agricultural education must overcome the challenges of declining enrollment, increased graduation requirements, and lack of funding for elective courses (National Research Council, 1988). According to Kitchen (1987), America's rural communities face increased challenges for providing equitable services and economic stability. Geographic distances, isolation, shrinking population bases, shrinking tax bases, and inadequate telecommunications infrastructures and related services are major obstacles that rural communities must overcome to attain economic and educational parity with urban communities.

Rural education associations have attempted restructuring of schools through consolidation--the merging of two or more schools into one location. Consolidation has the advantage of bringing students to instructors, thus allowing more time for instructors to concentrate on classes and sharing administrators (Crawford, 1990).

In order to attain educational parity, rural school districts have shared instructors and limited the time spent in each school. Class size is limited to the students available at particular hours of the day. Instructors operate under the burden of additional travel and preparation time in each school (Whisler, 1988).

Technology has produced another alternative: the use of interactive video networks (Whisler, 1988). Rural schools interact with other rural schools via interactive video networks--a type of distance learning. Distance learning is characterized by the use of technology to link instructors and learners who are physically apart from one another (Hughes, 1988).

McClelland (1987) reported that young people in small public high schools in sparsely populated areas experience barriers to taking courses such as vocational education, foreign languages, and advanced mathematics and science because these schools cannot afford to provide a large array of specialized courses. Education in the United States is constantly being monitored and often comes under criticism that calls for improvements to keep abreast of advancements in today's society. More specifically, the discipline of agricultural education is being monitored and evaluated to determine changes needed to keep pace with technology in agriculture (National Research Council, 1988).

Educators and teacher educators are faced with the challenge of how best to combine the many tools of distance education technology with the talents of educators (Norenberg & Lundblad, 1987). Distance education technology can provide a medium that will allow school districts to have an equitable share of the opportunities for advanced courses and other course that rural school districts may not be able to provide (Whisler, 1988).

Distance learning provided by video and audio technologies via interactive video networks (IVN) has helped to alleviate some of the problems facing rural America such as geographic isolation, declining enrollment, shrinking tax bases, and increased requirements for high school graduation (Whisler, 1988). As classes become smaller, the financial burden increases as a result of decreased state funds and retained costs of instructors and facilities (Mihalevich, 1990). By not offering low-enrollment classes, schools deprive students of educational opportunities. Rural public school districts without access to an interactive video network face two options: provide instructors for low-enrollment classes and thereby take on greater financial burden, or eliminate low-enrollment classes and ultimately leave students at an educational disadvantage (Whisler, 1988).

Much of the application of interactive video networks is to provide courses that otherwise would not be offered due to minimal student enrollment or to comply with increased state requirements for courses that must be offered. Distance learning provides students with opportunities to enroll in courses they may not have had the opportunity to experience previously. Distance learning also provides school districts with opportunities to offer classes in subjects for which many school districts do not have qualified instructors. Teacher/staff in-service and student development courses are other possibilities (Evans, 1988).

Another benefit for students who participate in interactive video networks is the capability for videotaping classes in the event students are absent. "Potential uses of interactive video networks are limited only by imagination, time, and budget" (deBlas, Knox, McArthur, Wallace, & Dean, 1988). "Interactive video network systems are limited in potential only by human constraints. Used creatively, the system can offer students a wider range of educational experiences than the institution, hindered by bricks and mortar, can possibly provide" (Kitchen, 1988).

In testimony to the Senate Committee on Labor and Human Services, Kitchen (1987) summarized the results of a study from 1983-1986 by the Minnesota Department of Education which researched the 11 technology demonstration sites in Minnesota implementing interactive video networks (IVN). Following is a summary of the Minnesota findings (Kitchen, 1987):

1. IVN allows schools to offer a wider range of elective courses and permits students greater access to subject matter.
2. IVN requires cooperation among schools. Whereas cooperation may be difficult, the improved programming would have been difficult or impossible to achieve without cooperation.
3. Teachers require training, preparation, and support to deal successfully with teaching via IVN. When teachers are properly prepared, they can adapt to and enjoy teaching via IVN. Seventy-five percent of the teachers who taught via IVN would choose to do so again.
4. Students enjoy learning via IVN and are motivated by it.
5. No systematic, statistically significant difference in achievement was found between students taking courses traditionally and those in IVN sections. Achievement does not seem to be influenced by the use of IVN.
6. IVN seems to be particularly appropriate for language and math instruction, for which it is heavily used.
7. IVN can be relatively expensive as a delivery system. Costs can be reduced, however, through business/education partnerships, cooperative purchasing, and planning.

The results of the study reveal a solid base for the effectiveness and the continued expansion and use of interactive video networks. "With these systems in place there is hope for rural America, without these systems there is not even hope" (Kitchen, 1987). Academic achievement has not been shown to be significantly different between those students taking courses taught traditionally and those in interactive video network settings (Barron 1987; US West Communication, 1988).

Agriculture makes up the largest percentage of America's economic base (Leistritz & Coon, 1991). The National Research Council's 1988 study of agricultural education in secondary schools revealed the committee's vision of what agricultural education is and should become at the secondary level if a competitive agriculture industry is to survive in this country: "Agriculture is too important a topic to be taught only to the relatively small percentage of students considering careers in agriculture." Rural America can deliver education about agriculture to more students through the technology of interactive video networks.

PURPOSE AND OBJECTIVES

The purpose of this study was to ascertain the perceptions of secondary educators (agricultural education instructors, principals, and superintendents) in the delivery of educational programs via interactive video networks (IVN). The objectives of this study are reflected in the following research questions:

1. What perceived level of understanding do educators have toward IVN?
2. What perceived level of interest do educators have toward using IVN?

3. What perceived obstacles exist preventing implementation of IVN education?
4. What programs are perceived as priorities for IVN delivery?

PROCEDURES

The population for the study included all agricultural education instructors, principals, and superintendents employed in public secondary schools having an agricultural education program during the 1990-91 school year in a midwestern state. The entire population was sampled. School districts having agriculture education programs were identified by the State Supervisor for Agricultural Education.

The survey instrument constructed for the purpose of this study was based on previous research conducted by Pullen (1989). Thirty-eight items within three parts of the instrument were examined for validity by a panel of experts. To determine the educators' self-reported level of understanding and interest in using two-way interactive television, a Likert-type scale (1-6) was utilized to define the levels. Six pilot sites that offer agricultural education programs were selected from a neighboring state's schools. Analysis of instrument reliability confirmed that the instrument provided sufficiently reliable data, $r = .91$ using KR-20 (Kuder-Richardson-20) at the .05 alpha level.

Data were gathered through the use of direct-mail questionnaires. The overall response rate for the questionnaire was 81.4 percent (201 of the 247). Measures of central tendency were calculated to ascertain the perceptions of educators toward the use of interactive video networks in the delivery of educational programs. To determine if significant differences existed between groups, multivariate analysis of variance (MANOVA) procedures were used. Univariate analysis of variance (ANOVA) procedures were used to determine whether any univariate differences existed (SPSS-x, 1988). An alpha level of .05 was used to ascertain significant differences.

RESULTS

A significant difference was found among educators in 6 of the 38 items dealing with level of understanding. Items were rank ordered with grand means (GM) ranging from 2.62 to 4.22. The rank order of items were similar for all groups. Educators' self-reported understandings were highest for the following items: (1) IVN GM = 4.22 and (6) cooperation necessary among schools who are using IVN GM = 3.87. Agricultural education instructors' self-reported understanding of IVN were significantly lower on all items than the responses of superintendents. Lowest ranking items of all groups were (4) training in the use of IVN, GM = 2.68 and (5) teaching classes using IVN, GM = 2.62. The lowest ranking items indicate a lack of experience in IVN usage.

Educators' Perceived Use of IVN as Students

The majority of educators, 75.6 percent, reported a willingness to participate on an IVN system as students. Lowest in ranking were principals at 65.1 percent; highest in ranking were agricultural education instructors at 85.0 percent. Results indicate that educators are willing to use IVN as students.

Educators' perceptions were not significantly different on eight survey items. Six of those eight items refer to financial resources. The six items include: (21) be less expensive than busing students, (34) be too expensive for our school, (27) give financial gain by providing classes to other schools, (18) be less expensive than sharing teachers, (33) require school to be a "provider" and receive little in return, and (36) create a classroom shortage. When finances are considered, educators indicate that they are in agreement. There is no indication, however, that agreement exists for the same reasons.

A significant difference existed among groups on 10 items focused on interest in using IVN. Items were rank ordered with a range in GM from 4.02 to 4.96. Educators' self-reported interest was strongest for the following items: (11) increasing the number of inservice programs for teachers, GM = 4.96; (9) offering continuing education for staff via IVN, GM = 4.95; and (12) encouraging the use of IVN by community, GM = 4.62. This self-reported interest is understood to indicate a desire to participate on IVN with their students. Agricultural education instructors' third-ranked item, (14) committing time to become familiar with IVN, GM = 4.47, was ranked sixth out of the ten items as ranked by three groups of educators. Principals' third-ranked item, (8) receiving classes from other schools via IVN, GM = 4.40, was ranked seventh out of the ten items by the three groups of educators. Lowest ranking items included (7) offering classes to other schools via IVN, GM = 4.30; (16) promoting school board in using IVN, GM = 4.20; and (13) teaching others to use IVN, GM = 4.02. Low-interest items indicate a need for practice in using IVN to gain confidence.

The four most frequently listed obstacles perceived as hindrances to successfully implementing IVN in rank order were: (a) costs; (b) negative attitudes of faculty, resistance to change, and "technophobia"; (c) selecting and training quality teachers for system; and (d) coordination of courses, time, schedules, and grading. Of all respondents, 70.6 percent reported cost as the highest-ranked obstacle to the successful implementation indicating one major reason IVN has not been used extensively. Negative attitudes of faculty, resistance to change, and "technophobia" were reported by 20 percent of the respondents and indicates a need for inservice to smooth the transition associated with change.

Educators' Perceived Use of IVN as Teachers

The majority of educators, 72.6 percent, reported a willingness to participate on an IVN system as teachers. Least willing were principals at 66.7 percent; most willing were superintendents at 76.9 percent. Results indicate that educators are willing to use IVN as teachers. Kitchen (1988) reported 75 percent of teachers who taught via IVN as willing to do so again.

The four most frequently listed priorities for use of IVN included (a) high school courses--advanced math and science, business, computers, agriscience, foreign languages, history, social studies, geography, fine arts, writing, English, speech, and home economics courses; (b) teacher inservice and/or staff development; (c) adult and community programs; and (d) continuing education and post-graduate courses. High school courses were reported as a priority by 87 percent of educators, whereas teacher inservice and/or staff development was noted by 43 percent of the respondents, which may indicate the educators' desire to stay current on technology and offer currently unavailable courses to all schools. Adult and community programs were identified by 36 percent.

On the following four survey items, agricultural education instructors had a higher mean perception than either of the administrators: (22) likely be replaced by other technologies in the future, (33) require school to be a "provider" and receive little in return, (40) eliminate teaching positions, and (36) create a classroom shortage. Based on these negatively worded items, a more negative attitude toward the technology is exhibited by agricultural education instructors than by principals or superintendents.

Educators' perceptions were not significantly different on eight survey items. Six of those eight items refer to financial resources. The six items include (21) be less expensive than busing students, (34) be too expensive for our school, (27) give financial gain by providing classes to other schools, (18) be less expensive than sharing teachers, (33) require school to be a "provider" and receive little in return, and (36) create a classroom shortage. When finances are considered, educators indicate an agreement. There is no indication, however, that agreement exists for the same reasons.

CONCLUSIONS AND/OR RECOMMENDATIONS

Interactive video networking is a relatively new technology, and educators have an unknown quantity of knowledge regarding the technology. Educators were surveyed to ascertain where their knowledge of interactive video network was acquired. Assumption One was presented in Chapter 1: The amount of knowledge of interactive video networks among respondents was adequate to formulate meaningful perceptions of the items presented in the instrument. Following are the major reported sources of information about IVN from highest to lowest: interactive video network systems in local schools and/or other sites (34.3%); demonstrations, workshops, personal observations, and/or telephone companies (32.8%); consortia, meetings, and the Department of Public Instruction (DPI) (28.9%); and magazines and journals (20.4%). Adequate knowledge of interactive video networks was gained by educators to formulate meaningful perceptions toward the use of interactive video networks.

Question One

A significant difference was found among educators in all items in Section A of the survey instrument. Educators possess adequate understanding of IVN, cooperation necessary among schools who are using IVN, and classes or programs used on IVN. Educators possess least adequate understanding of teaching methods to be used on IVN, training in the use of IVN, and teaching classes using IVN. The items ranked lowest refer to the application of interactive video networks and indicate a lack of experience in the actual use of IVN.

Question Two

A significant difference existed among groups on all items. Educators' interest in interactive video networks regarding inservice programs and continuing education for the school staff and community indicates a desire to gain more exposure to IVN by participating with the system from a student-type role. Educators' lack of interest in offering classes to other schools, promoting school board use, and teaching others to use IVN indicates a need for practice in using IVN to gain confidence.

Question Three

The four most frequently listed obstacles perceived as hindering the successful implementation of interactive video networks by rank order include costs; negative attitudes of faculty, resistance to change, and "technophobia"; selecting and training quality teachers for system; and coordinating courses, times, schedules, and grading.

The fact that cost was considered an obstacle to the implementation of interactive video networks, by greater than a three-to-one margin over the second-ranked obstacle, indicates a very evident reason why more schools have not implemented interactive video network. Negative attitudes of faculty and resistance to change indicate a need for inservice to smooth the transition associated with change.

Question Four

High school courses were reported as a priority by 87 percent of educators, nearly two times the number of the second priority. Teacher inservice and/or staff development was ranked second in priority by 43 percent of the respondents. Adult and community programs were ranked third with 36 percent of educators indicating this as a priority. Educators' second highest ranking priority teacher inservice and/or staff development, may indicate a desire to stay current on technology and offer currently unavailable courses to all schools.

Based upon the findings reported, the following conclusions have been formulated:

1. Educators accept interactive video networks as appropriate technology for high schools.
2. Educators express interest in gaining more knowledge of IVN through inservice.
3. There is a perceived need for financial assistance in the start-up of interactive video network sites.
4. There is a need for inservice in educating teachers, principals, superintendents, and

constituents of the school districts involved with IVN.

5. Rural America can deliver education about agriculture to more students through the technology of interactive video network.

RECOMMENDATIONS FOR FURTHER RESEARCH

Based upon the findings and conclusions, the following recommendations are offered:

1. Similar studies should collect data from a population made up of all educators.
2. Future studies should concentrate on the courses to be taught via IVN, and the results should be shared with curriculum writers to develop courses specifically for IVN delivery.
3. Results of this study should be reviewed by State Boards for Vocational Education for the purpose of educating teachers in American public high schools.
4. Results of this study should be reviewed by all teacher educators to assist in the preparing of future teachers and fulfilling the inservice needs of present teachers.
5. Future studies should collect data from school districts using IVN for specific system uses.

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FACTORS RELATED TO THE EDUCATIONAL AND CAREER CHOICES OF TALENTED YOUTH

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INTRODUCTION

Wolf (1988) indicated there is a significant need for professionals with expertise in the food and agricultural sciences if the U.S. is to remain competitive in scientific developments and technology. Coulter, Stanton and Goecker (1990) predicted an annual shortage of 11% of qualified graduates through the mid-1990s. These opportunities in agriculture occur at a time when agriculture enrollments have declined. Coulter (1985) credited the decline in enrollments to the "farm problem" image conveyed in newsprint, on television and movie screens, and heard on radio. Mallory and Sommer (1986) reported many students admitted having a lack of knowledge about agriculture in general and of having a poor image of agriculture. In 1988 the Farm Foundation requested the American College Testing (ACT) Program to conduct a survey to determine high school students' perceptions regarding college majors and careers and to determine what factors influence college choice. The results indicated:

> The majority of students in the non-agriculture group had little awareness of careers in agriculture, postsecondary institutions offering agricultural curriculums and agricultural majors. What knowledge they did have came from media sources, particularly television. All three groups had preconceptions about agricultural majors and career paths. Intervention to change perceptions must be planned prior to the senior year of high school. (p. ii)

Currently the Pennsylvania Department of Education (PDE), the state's educational intermediate units (IUs) and Penn State are responding to the critical need for agricultural scientists by offering a five-week summer residence program for outstanding high school sophomores and juniors, including the handicapped, who have demonstrated exceptional ability in the sciences and who have a high interest in some phase of agriculture. This program, the Pennsylvania Governor's School for the Agricultural Sciences (PGSAS), has general goals which include providing an experiential-based program to assist gifted and talented students explore educational and career opportunities in the agricultural sciences.

Silverman (1989) suggested that gifted students need extra time and special activities to assist in career and educational decision making. She noted an effective career guidance approach is to provide gifted students with real-life experiences in their areas of interest via internships, mentorships and special programs. Herr (1976) claimed gifted students may be multi-potential in their capability to do a wide range of tasks in a superior fashion. Herr noted that gifted students benefit by working with persons who are achieved professionals in the arts, sciences and humanities; "gifted and talented youth seem to manifest a need for testing the reality of different career possibilities through actual performance, experimentation or other direct involvement with these foci" (p. 103). That provides a basic tenant for the design of the PGSAS program designed to assist talented and gifted students interested in the agricultural sciences.

Chartrand and Camp (1991) indicated career decision making is a microanalysis of career development. They suggested that three influential approaches have emerged relative to career decion making—a developmental approach, classical decision-making theories based on decision-making models and identification and differentiation of individual differences in career decion making (p.

11). Cebula and Lopes (1982) indicated student choice of an educational major and subsequently a career was influenced by a variety of pecuniary and nonpecuniary factors.

Meier (1991) indicated research in the area of vocational choice focused on personal variables and the interaction of those personal variables with environmental factors. Vocational choice was related to gender (Alpert & Breen, 1989; Hannah & Kahn, 1989), academic ability (Fassinger, 1990), socioeconomic status (Poole, Langon-Fox & Omodei, 1990) and psychological constructs such as locus of control (Ellerman & Johnston, 1988). Smart (1989) found that a person's vocational type orientation was related to family background, educational preparation, occupational aspiration and personal orientation.

Gottfredson (1981) suggested that when making career choices individuals first compromised in terms of their vocational interests and then job prestige. Hesketh, Elmslie and Kaldor (1990) found that when making career choices high school students perceived interests as most important, followed by prestige and then sex-type. Bandura's (1977) theory of self-efficacy in vocational decision making was supported by Bluestein (1988) and Taylor and Popma (1990). Gender differences in self-efficacy for traditional and nontraditional occupations exist across gender lines.

PURPOSE AND OBJECTIVES

The following research questions were formulated.

1. What factors influence the choice of a postsecondary education major, and to what extent is the choice of a major influenced by gender, residential status, parent's educational level, the high school curriculum completed and previous participation in agricultural youth organizations?

2. What factors influence the choice of a career, and to what extent is the choice of a major influenced by gender, residential status, parent's educational level, the high school curriculum completed and previous participation in agricultural youth organizations?

3. What are the perceptions of PGSAS participants toward agriculture?

PROCEDURES

Population

The target population for this study was all 313 program participants from the Pennsylvania Governor's School for the Agricultural Sciences from 1986-1990. A census was conducted.

Instrument Development

Permission was received from The Farm Foundation to use portions of their questionnaire developed by Educational Testing Services in developing the questionnaire for this study. A questionnaire of 133 questions was pilot tested using 107 urban agriculture high school students and freshman students enrolled in Freshman Seminar (Ag 198) in the College of Agricultural Sciences at The Pennsylvania State University. The purpose of the pilot test was to establish content validity and identify potential problems regarding the interpretations of the statements and to secure a preliminary estimate for the reliability of the career perceptions component of the questionnaire. The career perception component had a Cronbach's alpha reliability of .67. The questionnaire was also reviewed by a panel of experts, comprised of faculty and students, to assess content validity.

Data Collection

Prior to mailing the questionnaire a personal telephone call was made to all PGSAS participants requesting their participation and explaining the purpose of the study. Subsequently a cover letter, number-coded questionnaire and self-addressed, stamped envelope were mailed to the 313 PGSAS participants. Nonrespondents were followed up with a second survey form and with a telephone contact. Usable responses were obtained from 75.08% of the PGSAS program participants.

RESULTS

Profile of PGSAS Participants

Over half (56%) of the PGSAS program participants were female. The majority (90%) of the participants were white or Anglo-American. Forty-four percent were rural farm or nonfarm youth.

The majority (58%) of program participants' fathers were college graduates, and over 40% had completed graduate work beyond the bachelor's degree. Forty-eight percent of program participants' mothers were college graduates and one-quarter of the mothers had completed graduate work. One-half of the program participants' fathers occupations were classified as professional. Thirty percent of the program participants' mothers occupations were classified as professional or technical. A quarter of the program participants' mothers were full-time homemakers.

The majority (77%) of the program participants had completed a college preparatory curriculum in high school, with 13% completing a combined vocational/college high school curriculum. Four-fifths of the program participants had an A average (>3.67 HSGPA). Thirty-five percent were FFA and/or 4-H members. One-third of the PGSAS program participants received national merit scholar recognition. All PGSAS participants completing high school had continued into some form of postsecondary education with 58% of the participants attending a public, four-year institution and the remainder attending private colleges.

Factors in Education Major Choice

Two groups of factors were evaluated for their influence on the choice of a college major: persons/experiences and personal concerns. Participants did not rate any one experience or individual as having a strong influence on their choice of a major. In selecting a college major the four most influential persons or experiences identified were PGSAS, parents, persons employed in a profession and high school teachers. Yet, each of these was identified as having only some influence. The least influential individuals or experiences influencing a choice of major were siblings, high school counselors and admini-strators, relatives and friends. They were rated as having a low influence on choice of a major (Table 1).

A second group of factors, personal concerns, was examined to determine which were most important in selecting a major. Four personal concerns were identified as being very important in choice of a major: personal interests, personal happiness, personal abilities and skills and career interests. Three personal concerns identified as having lowest importance in selecting a major were prestige of career for the major, personal past work experience, and money I can earn (Table 1).

The relationships between selected educational and demographic variables were examined for their influence in selection of a major (Table 2). Moderate relationships were found between agricultural youth organization membership (phi=.31), the high school curriculum completed (phi=.34) and father's (phi=.31) and mother's (phi=.26) educational level and whether the youngster selected an agriculture major or some non-agriculture major. A lower relationship (phi=.22) was found for the type of residence where the youngster was raised and the choice of major.

Table 1
Most and Least Influential Factors of Choice of Major and Professional Career

Major Influence Level	Mean Rating	Rank
Individual/Experience Factors		
Most Influential		
PGSAS	2.11	1
Parents	2.04	2
Person in profession	1.79	3
High school teachers	1.74	4
Least Influential		
High school counselors/ administrators	1.27	12
Siblings	1.33	11
Relative	1.41	10
Friend	1.53	9
Personal Factors		
Most Important		
Interests	2.91	1
Personal happiness	2.84	2
Abilities/skills	2.78	3
Career interests	2.76	4
Least Important		
Prestige of career for major	1.71	11
Past work experience	1.74	10
Salary for major	1.89	9
Difficulty of major	1.90	8

Career Influence Level	Mean Rating	Rank
Individual Experience Factors		
Most Influential		
Person in profession	2.06	1
PGSAS	2.04	2
Parents	1.90	3
Least Influential		
High school counselors/ administrators	1.18	12
College admission personnel	1.25	11
Sibling	1.33	10
Relative	1.36	9
Friend	1.50	8
Personal Factors		
Most Important		
Interests	2.92	1
Personal happiness	2.91	2
Ability/skills	2.80	3
Least Important		
Creativity	1.26	11
Own/operate my business	1.40	10
Have a position of authority	1.62	9
Prestige of career	1.71	8

Note: Ratings could theoretically range from 1-3, with 3 being highly important or most influential.

Factors in Career Choice

There was no person/experience factor identified as being a strong influencing factor in the choice of a career. In selection of a career the three factors with some influence were persons in the profession, PGSAS experience and parents. The least influential individuals or experiences were high school counselors/administrators, college admission personnel, siblings, relatives and friends (Table 1).

A second group of factors, personal concerns, was examined to determine which were most important in career selection. Three personal concern factors identified as being very important in the career choice included personal interests, personal happiness and personal skills and abilities. The four least important personal factors in career choice were being able to be creative, owning a business, having a position of authority and the prestige of the career (Table 1).

Table 2. Educational and Demographic Factors Related to PGSAS Participants' Decisions Regarding the Type of Career Sought and Educational Major They Plan to Pursue.

Variable	N	Career Non-Ag	Career Ag	Phi Coefficient	Major Non-Ag	Major Ag	Phi Coefficient
		-----Percent----			----Percent----		
Youth Organization Membership	235			.23**			.31**
Member of FFA, 4-H or Both		70.2	42.6		76.0	44.7	
Not a Member of FFA or 4-H		29.8	57.4		24.0	55.3	
High School Course of Study	208			.29**			.34**
College Prep		91.4	66.7		94.8	70.3	
Voc/College Prep Combination		8.6	33.3		42.3	29.7	
Gender	234			.04			.05
Male		44.9	40.4		42.3	47.1	
Female		55.1	59.6		57.7	52.9	
Residence Area	235			.13*			.22**
Rural (Farm and Non-Farm)		41.0	57.4		36.0	58.8	
Urban (Incls Town & City)		59.0	42.6		64.0	41.2	
Father's Education Level	233			.12			.31**
Less than College Degree		39.0	54.3		30.9	61.9	
College Degree		61.0	45.7		69.1	38.1	
Mother's Education Level	235			.22**			.26**
Less than College Degree		46.8	74.5		42.7	69.4	
College Degree		53.2	25.5		57.3	30.6	

* $p \leq .05$
** $p \leq .01$

Relationships between selected educational and demographic variables were examined for their influence on career choice (Table 2). A moderate relationship (phi=.29) was found between the high school course of study and whether a person selected an agriculture or some other career. Lower relationships were found between youth organization membership (phi=.23), residence where the youth was raised (phi=.13), mother's educational level (phi=.22) and the choice of a career.

Perceptions of Agriculture

Program participants' current perceptions (Figure 1) of careers in or related to food, agriculture and natural resources were generally positive than those reported in the Farm Foundation study (1989). A majority of participants did not associate agricultural careers with farming or manual labor. The majority also disagreed that agricultural careers were unattractive to females and minorities, and were generally positive in regard to advancement opportunities in agriculture, the number of job opportunities, salary potential as compared to other college graduates and whether agriculture graduates are able to pursue other science careers. Program participants did agree that agricultural graduates are desired by multinational corporations. The majority of participants disagreed that careers in agriculture are insecure because the agricultural economy fluctuates, agriculture careers are rarely affected by world events and agricultural careers are dependent on the weather.

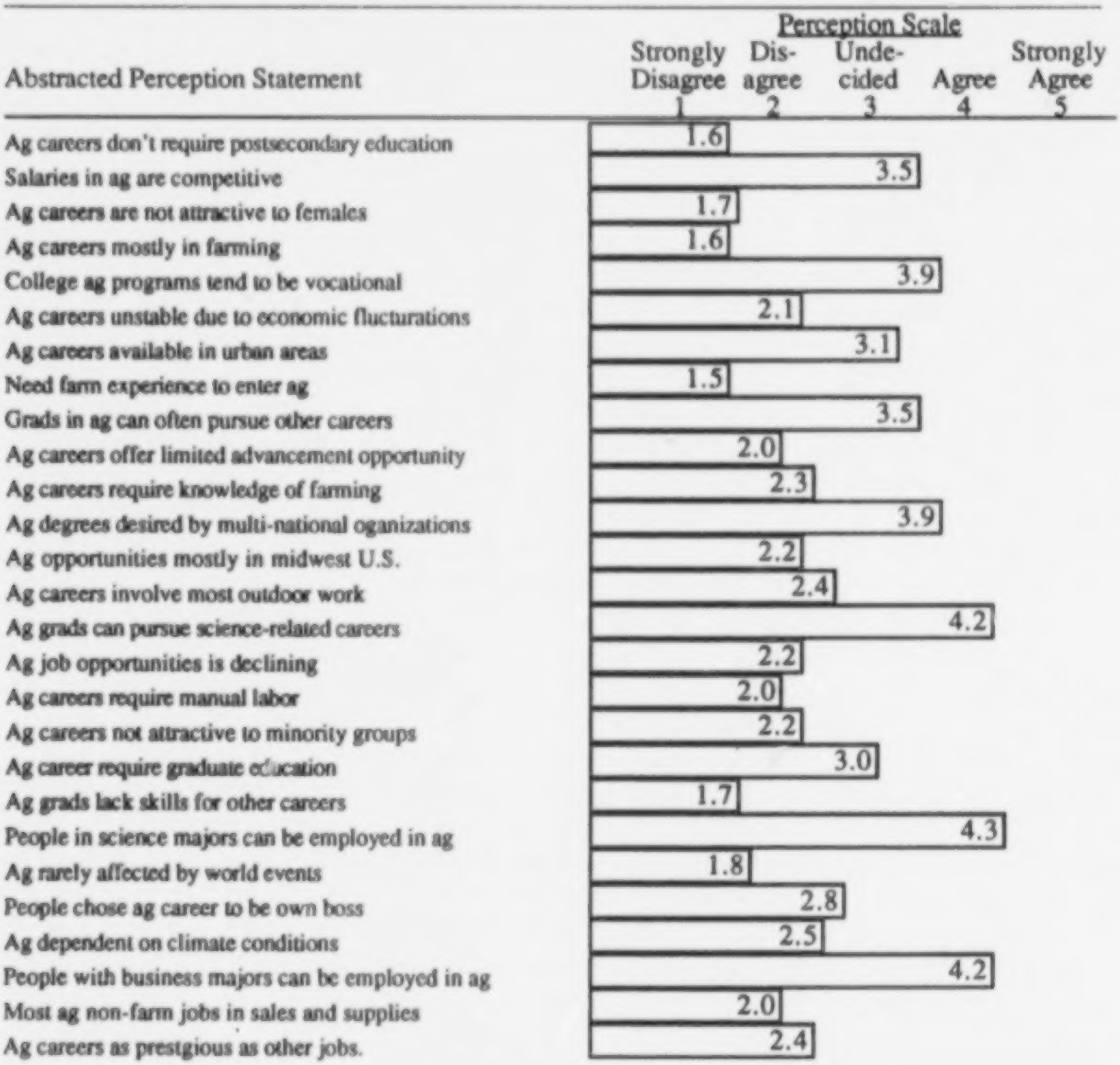

Figure 1. PGSAS Participants' Perceptions of Agriculture.

IMPLICATIONS

In identifying implications it must be remembered this study focuses on PGSAS self-reported information. With that as a recognized study limitation, the following selected two educational implications are offered. First, for gifted and talented students the most influential factors which we have perceived to be important in choice of a career or major aren't uniformly supported. As supported by Bugaj (1990) parents have *some* influence. The importance attached to friends and peers influencing educational and career choice didn't hold for PGSAS participants. The writing of others (Silverman, 1989) supports that gifted/talented students are more self-directed and independent than the "typical" student. Thus we in colleges and in high schools, if we desire to attract gifted/talented students, need to think about how we package our programs and the kinds of activities we offer. The gifted/talented need and want purposeful experiences which provide flexibility and draw upon their skills and interests.

The second implication goes beyond the parameters of the study and raises the question regarding the role of high school agriculture teachers. The study supports that a person in the career and high school teachers are important factors in the choice of a career and major. It seems to us that local agriculture teachers are an important source of information regarding agricultural career role models and learning activities which should be recognized by local school teachers and guidance personnel. Local school personnel must be more willing to provide gifted/talented students to explore, through flexible schedules and learning experiences, agricultural career and educational opportunities. It is our experience that agricultural teachers continue to be a valuable resource tending to be undervalued by personnel responsible for assisting with career guidance, career and personal development.

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AN ASSESSMENT OF MICROCOMPUTER UTILIZATION IN WEST VIRGINIA SECONDARY SCHOOL AGRICULTURE PROGRAMS

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INTRODUCTION

Microcomputers are playing an increasingly important role in the management of world agricultural and forestry resources. They can assimilate vast quantities of information rapidly, and facilitate improved utilization of agriculture's resources. As Camp, Moore, Foster and Moore (1988) stated, "Computers have had a great influence on the growth and development of agriculture. Computers can collect, store, sort, arrange, classify, calculate, and process enormous amounts of information" (p. 14). The use of microcomputers is becoming more and more important both in developed and developing countries of the world. Camp et al. (1988) suggested that "Computers are being used in every phase of agriculture, from farming and ranching to agribusiness to scientific agricultural research" (p. 7). Zidon and Luft (1987) stated that "the number of microcomputers found in public school systems has increased dramatically over the last few years" (p. 9). Similarly, Miller and Kotrlik (1987) reported that "the number of vocational agriculture programs with microcomputers continues to increase as this technology gains support from school systems as a result of the Carl Perkins Vocational Education Act" (p. 34).

With the widespread use of microcomputers in agriculture and the increasing numbers present in public schools, one would expect that microcomputers would be an important instructional tool in secondary school agriculture programs. Studies of microcomputer utilization by secondary school agriculture teachers (Malpiedi, Papritan & Lichtensteiger, 1985; Sutphin, 1984;) have shown that although microcomputers are available to teachers, they have not been effectively incorporated into the instructional process. Much of the use of microcomputers by agriculture teachers has been in the management of instruction, not as a direct part of the instructional process (Sutphin, 1984; Miller & Kotrlik, 1987). More recent studies (Zidon & Luft, 1987; Raven & Welton, 1989) indicated that secondary school agriculture teachers were using the microcomputer directly in many areas of agricultural instruction.

Since 1982, agriculture teachers in West Virginia have been infusing microcomputer applications into agriculture instruction at the secondary level. Through inservice training and equipment grants, teachers have been provided the basic components upon which to build microcomputer assisted instruction in agriculture. This study was conducted to determine how microcomputers are being used by agriculture teachers in West Virginia and what, if any, problems they have encountered as they try to use a rapidly changing instructional technology.

OBJECTIVES OF THE STUDY

The specific objectives of this study were:

1. to determine the perceived level of microcomputer competence possessed by secondary school agriculture teachers in West Virginia.
2. to determine the activities or tasks for which secondary school agriculture teachers use microcomputers.
3. to determine the types of microcomputer hardware and software presently available to secondary school agriculture teachers.
4. to identify problems which limit secondary school agriculture teachers' use of microcomputers.

METHODOLOGY

Descriptive survey research was used to obtain data for this study. The investigator developed a questionnaire structured to solicit the information needed to accomplish the objectives of the study. Content validity was established by a panel of experts consisting of faculty members in the College of Agriculture and Forestry and Agricultural Education staff at the West Virginia State Department of Education. The instrument was pilot tested on graduate students enrolled in the Division of Resource Management at West Virginia University. The eight day test-retest reliability of the instrument was $r=.84$.

The population for this study was the 102 secondary school agriculture teachers in West Virginia during the spring of 1991. In March of 1991 survey instruments were sent to all teachers in the population. The initial and follow-up mailings of the survey resulted in a 60% response rate.

Respondents were categorized as early respondents and late respondents. Research has shown that late respondents are similar to non-respondents (Miller & Smith, 1983). An analysis of early and late respondents' answers found no significant differences ($p < .05$) between these groups. Therefore, the assumption was made that results of the study would be representative of the entire population.

FINDINGS

On the knowledge and skill section of the instrument (1=None, 2=Minimal, 3=Average, 4=Above average, 5=Extensive), teachers indicated average knowledge and skill in the areas of how computers work ($\bar{x}=3.17$), use of the disk operating system ($\bar{x}=3.05$) word processing ($\bar{x}=3.03$), and agricultural software ($\bar{x}=2.55$). Teachers reported minimal knowledge and skill in the areas of spreadsheets ($\bar{x}=2.48$), databases ($\bar{x}=2.43$), computer assisted instruction ($\bar{x}=2.32$), test generation and scoring ($\bar{x}=2.28$), telecommunications ($\bar{x}=2.20$), use of Grade book software ($\bar{x}=2.12$), graphics ($\bar{x}=2.05$), programming ($\bar{x}=1.98$), desktop publishing ($\bar{x}=1.97$), use of authoring software ($\bar{x}=1.77$), and statistical packages ($\bar{x}=1.73$). None of the knowledge and skill items had mean ratings in the above average or extensive categories.

Table 1

Microcomputing Knowledge/Skills of West Virginia Agricultural Education Teachers

	Mean	Sd
How computers work	3.17	0.85
Disk operating systems (DOS)	3.05	0.93
Spreadsheets	2.48	0.91
Databases	2.43	0.98
Word processing	3.03	1.04
Telecommunications	2.20	0.92
Graphics	2.05	0.89
Statistical Packages	1.73	0.73
Programming	1.98	0.89
Desktop publishing	1.97	1.02
Authoring packages	1.77	0.81
Test generating/scoring	2.28	0.94
Computer assisted instruction	2.32	0.83
Gradebooks	2.12	0.85
Agricultural software	2.55	0.77

Over 75% of the teachers responding indicated that they used the microcomputer for producing handouts and work sheets, and tests and quizzes. Almost 62% reported using the microcomputer to generate posters or banners. A little over 40% of the teachers reported using databases to create mailing lists and labels. Less than 25% of the teachers reported using spreadsheets in any way and only 35% reported using agricultural software in their instruction (Table 2). These findings are consistent with those of Malpiedi, Papritan & Lichtensteiger (1985) and Sutphin (1984) which showed that although microcomputers are available, agriculture teachers have not been effective in incorporating them into the instructional process.

At the time of this study, most of the teachers were still using the hardware and software provided through inservice activities and equipment grants awarded in the early 1980s. Less than half of the teachers had purchased additional hardware or software since the inception of the microcomputing emphasis in agriculture. A little over 18% of the teachers reported having no computers located in their agriculture departments. About 75% reported having access to a school microcomputer lab, yet only 43% reported using the lab for microcomputer instruction in agriculture (Table 3). Given the rapid change in both hardware and software, most of what is presently available to these teachers is of limited value and plans for upgrade and improvement seem unorganized and sporadic.

Table 2

Activities and Tasks for Which Agricultural Education Teachers Use Microcomputers

	n	%
Overheads	08	13.3
Computer generated presentations	13	21.7
Computer assisted instructional lessons	28	46.7
Handouts/Worksheets	28	46.7
Tests/Quizzes	45	75.0
Posters/Banners	47	78.3
Lesson plans	37	61.7
Wordfinds or other teaching aids	22	36.7
Class lists and grade records	21	35.0
Spreadsheets for student records	23	38.3
Spreadsheets for student record book	05	08.3
Spreadsheets for business analysis	13	21.7
Spreadsheets for decision making	07	11.7
Data bases to create inventories	16	26.7
Data bases to create address lists	26	43.3
Data bases to create mailing labels	24	40.0
Agricultural software in the instructional process	21	35.0
Agridata	06	10.0

When asked to identify problems associated with access to school microcomputer labs a majority of the teachers (70%) indicated difficulty scheduling the lab during designated class periods. Many of the teachers related that the microcomputer labs were used exclusively for business and related courses with little or no access for other classes.

A number of problems were identified by the agriculture teachers as barriers to the use of microcomputers in their programs. Lack of hardware (17%), lack of time (20%), need training (28.3%), lack of interest (10%) and lack of software (8.3%) were some of the commonly identified problems. Suggestions for ideas that might promote increased use of microcomputers in agriculture departments included providing more computers for each department (16.7%), and workshops or inservice training (40%). The problems expressed here may, in part, explain the low ratings of microcomputing knowledge and skills as well as the limited use in actual classroom instruction.

Table 3

Number of Departmental Computers and Access to School Microcomputer Labs

		n	%
Number of computers located in the agriculture department	0	11	18.3
	1	44	73.3
	2	02	03.3
	3 or more	03	05.0
		60	100.0
Access to a school microcomputer lab	yes	44	73.3
	no	16	26.7
		60	100.0
Use lab for microcomputer instruction in agriculture	yes	26	43.3
	no	34	56.7
		60	100.0

CONCLUSIONS AND IMPLICATIONS

Microcomputing technology has changed rapidly over the past 10 years. Some believe that the microcomputer will become the dominant delivery system in education within the next twenty years (Bork, 1985). As the use of microcomputers in secondary school agriculture programs continues to grow, it is important to understand the stages in this growth process so that appropriate strategies can be planned for future microcomputer utilization. Findings of this study indicate that most teachers have access to at least one microcomputer and the primary use is the development of material in support of instruction. Very limited use is being made of microcomputers in the instructional process and the use of agriculturally related software by students is almost non existent. Teachers reported a lack of hardware, software, training, and time as barriers to the increased use of microcomputers in their programs.

Teachers, administrators and the West Virginia Department of Education must develop strategies for updating microcomputer hardware and software. It is recommended that the State Department of Education, the West Virginia Agriculture Teachers Association and the teacher education department at West Virginia University form a committee to develop a five year plan for meeting the microcomputing needs of agriculture teachers. Funding alternatives for the purchase of hardware and software need to be identified. West Virginia agriculture teachers and teacher education institutions must recognize the need for continued inservice to keep pace with the ever-changing technology. The five year plan should include appropriate inservice activities aimed at helping agriculture teachers stress the importance of this technology to their students through its inclusion in the instructional process.

Teachers, teacher educators and state supervisory staff need to place greater emphasis on the use of microcomputers in problem analysis and solution. All agriculture students must have access to and instruction in the use of microcomputers. Only through active and continued use can students develop skills and see the value and benefits of microcomputer utilization in agriculture.

Keeping pace with rapidly changing technology has been a problem for all areas of vocational education over the last three decades. For West Virginia secondary school agriculture programs to produce quality graduates ready to meet the demands of today's work place, they must have up-to-date microcomputing hardware and software. Agricultural educators in West Virginia must work together to see that this important technology is better utilized in the instruction of agriculture students.

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THE FEASIBILITY OF A CATFISH FARMING CURRICULUM IN GEORGIA'S AGRICULTURAL EDUCATION PROGRAM

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INTRODUCTION

Catfish farming is a multi-million dollar business in the Southern Region; there are more than 130,000 acres of ponds and more than 280 million pounds of catfish processed each year (Louisiana Cooperative Extension Service, 1990). It is estimated that by the year 2000, U.S. production may reach a million metric tons (Agriculture 2000: A look at the future, 1983, p.163). In addition, it is predicted that 25% of the world's fish supply will come from aquaculture (AAVIM, 1989).

Education in aquaculture is at the formative stage in agricultural education. The National Research Council (1988) recommended that "new curriculum components must be developed and made available to teachers..." (p.35). Some material is already available. Lee (1981) in his book, Commercial Catfish Farming, promoted instruction in aquaculture at the high school level. The Cooperative Extension Service, USDA and some state curriculum centers have a limited number of publications on fish farming, which are available to schools. Recently, the National Council for Agricultural Education reported on a nationwide survey of curriculum in aquaculture, "...aquaculture is receiving increasing recognition in U.S. educational curricula. The quality of effort at the secondary level, however, is currently only average..." (The Council, 1990, p. 1). In addition, little research has been conducted on implementing aquaculture in agricultural education programs in the South or nationally. Therefore, the problem of the study was to determine current levels of instruction on catfish farming in the State of Georgia and the potential for growth of the program in agricultural education.

PURPOSE AND OBJECTIVES

The primary purpose of the study was to determine the current status and future potential for instruction in catfish farming in Georgia's agricultural education program. Specific objectives were to:

1) determine the attitudes of teachers of agriculture toward an educational program in catfish farming.
2) identify levels of facilities, equipment, supplies and finances available to support instruction in catfish farming.
3) assess the level of administrative support for instruction in catfish farming.
4) determine the basic knowledge of catfish farming that teachers of agriculture possess.

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PROCEDURES

This was a descriptive study using a telephone interview data-gathering technique. The population was head teachers of all high school agricultural education programs in Georgia. A stratified random sample of departments of agricultural education was drawn by identifying, in each of the four districts, every third school having an agricultural education program. The head teacher was called on the telephone and interviewed on a researcher-prepared schedule of questions. The interview schedule was developed from the literature and the researchers' experience. The instrument was trial tested with a group of teachers, teacher educators and supervisory staff. The data were collected during June and July, 1991. All schools in the sample provided data for the study.

ANALYSIS OF DATA

The data were transferred to optical scan sheets and processed at the University of Georgia Computer Center using SAS and SPSS programs. Primarily descriptive statistics -- means, frequencies and percentages -- were used.

RESULTS

Demographics

Forty-two head teachers of agriculture in Georgia provided data for the study; the departments involved in the study represented one-third of the regular agricultural education programs in the state. Nearly two-thirds (26 or 62%) of the respondents had taught less than 10 years; 13 or 31% had taught 10 to 20 years and 7 or 17% had more than 20 years of experience. Nearly one-half (19 or 46%) of the respondents had a bachelors degree only; another 46% had a masters degree; only 3 (7%) had a specialist or doctoral degree. Enrollment in respondents' programs was primarily in the 100 to 200 student category (24 respondents or 60%); the remainder had fewer than 100 students. One-fourth of the head teachers (11 or 26%) reported more than 100 FFA members. When asked what experience they had with catfish farming, nine (21%) of the respondents said that they had attended one or more workshops on catfish farming; five (12%) indicated that they had attended classes on catfish production while a similar number had raised catfish; four (10%) had taught classes on the subject; and three (7%) had worked in the industry. Thirteen or 31% reported that they had one-to-five students who raised catfish for SAE projects.

Teacher attitudes about catfish farming education

When asked if they taught catfish farming in their program, 27 (64%) reported "no"; however, the remaining 15 respondents (36%) taught such varied topics as oxygen depletion, wildlife/natural resources with aquaculture as a part, maintenance/stocking requirements of ponds, and a basic overview of the industry.

Respondents indicated the time they would spend on catfish farming if it were in their curriculum was as follows: a lesson in a unit (18 or 42%); a unit (17 or 40%); a grading period course (5 or 12%); and a semester (2 or 5%). When asked about student interest in studying catfish farming, 33 respondents (89%) said that from 10% to 80% of the students would be interested.

Availability of resources

Teaching materials reported as available in respondents' schools were as follows: Extension bulletins (23 or 55%); videos (7 or 17%); books (6 or 14%); films were listed by one respondent. In describing the facilities available at their respective schools, six (14%) had access to a pond; three (7%) had a tank or a barrel; and two (5%) had an aquarium. No one had access to a raceway. The most feasible facilities to develop were listed as: tank or barrel (20 or 48%); an aquarium (19 or 45%); a pond (13 or 31%); and a raceway (1 or 2%).

The 42 head teachers reported an average annual supply budget of $1,427 for their departments; one-third (13 or 31%) said that less than 10% of the budget could be used for instruction in catfish farming, while another one-third (15 or 36%) said that from 10 to 20 percent could be used; the remainder indicated from 20% to 90% could be devoted to catfish farming instruction. In terms of the likelihood of local funds becoming available to construct a $2,000-4,000 pond, the respondents indicated, on a scale of 1 to 5, a mean score of 1.9 (low likelihood).

Administrative knowledge and support

The head teachers were asked to rate their administrators' knowledge, interest and involvement in catfish farming. On a scale of one to five, with one being lowest, administrator knowledge was rated 1.81; involvement was 2.19; and the interest level was 2.88.

Regarding the degree of support that their administrators were likely to provide for instruction in catfish farming, three-fourths of the respondents, 32 or 76%, gave a three-to-five rating for a total group mean score of 3.21, or moderate support.

Teachers' basic knowledge of catfish farming

Respondents were asked six basic questions about catfish farming. Three-fourths of the teachers (32 or 76%) were correct in identifying dissolved oxygen as the major limiting factor in determining the pounds of catfish that can be raised in a body of water. Sixteen (38%) knew that the same amount of catfish can be raised in cages in a pond as can be raised in the pond without cages. Twelve (29%) knew that it took about two pounds of feed per pound of gain for a catfish. Ten (24%) selected the correct percentage of world fish supply that would come from aquaculture--25%. Seven (17%) knew that 3,000 to 6,000 pounds of catfish can be produced per surface acre of ponds, assuming optimum management. However, only three (7%) knew that their home state, Georgia, was the tenth ranked catfish-producing state in the nation.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

It was concluded that:

1. Respondents accurately represented the population of head teachers of agriculture in Georgia. The typical respondent had less than ten years of experience, held a bachelors or masters degree, taught in an agricultural education program enrolling more than 100 students, and had fewer than 100 FFA members. Typically, head teachers of agriculture in Georgia lacked experience and/or education for teaching catfish farming.

2. Two-thirds of the lead teachers of agriculture in Georgia had not taught catfish farming in agricultural education. However, most of the respondents would be willing to incorporate at least a unit into their programs if appropriate curriculum and other support materials were available. Nine out of ten head teachers of agriculture believed that students would be interested in learning about catfish farming.

3. To a large extent, the only readily available instructional material on catfish farming comes from the Cooperative Extension Service. Books and videos were available to only one-third of the programs. Only about one in ten of the schools currently have facilities for teaching catfish farming. Head teachers of agriculture believe that a tank or barrel system would be most feasible for adding to their facilities. Funding for instruction in catfish farming is limited and head teachers of agriculture believe that there is little likelihood of additional funding for supplies or facility development.

4. Head teachers of agriculture rated their administrators' knowledge of catfish farming as low; their involvement to be slightly higher, and their interest to be moderate. Given these facts, anticipated support of these administrators for implementing catfish farming in the program was much higher than would be expected. Three out of four lead teachers of agriculture in Georgia believe that their administrator would support implementation of catfish farming in the agriculture curriculum.

5. The knowledge level of head teachers of agriculture in catfish farming reflected their lack of experience and/or preparation in the subject. Those respondents who had work experience, training or teaching experience in catfish farming scored consistently higher on cognitive test questions relating to the subject.

Recommendations

Based on the findings and conclusions, the following recommendations are made:

1. Inservice training and graduate education in catfish farming should be provided for all teachers of agriculture in Georgia, especially those responsible for

departmental program development. Courses on the subject should be made available in the preservice teacher preparation program in order to improve the knowledge and experience levels of beginning teachers.

2. State incentives should be provided for the traditional production agriculture programs to incorporate instruction in catfish farming. Teachers and administrators should be made aware of successful programs that exist in this area of study.

3. Experienced teachers of agriculture and a technical advisory group from the industry should be brought together to develop a basic course of study for teaching catfish farming. Instructional materials on the subject should be secured, adapted or developed and disseminated to all secondary school agriculture programs in the state.

4. Additional research should be conducted on teaching catfish farming in agricultural education, including traditional production programs, horticulture programs, urban centers, middle schools and other non-traditional programs.

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PROFILE OF THE AGRICULTURAL COUNTY EXTENSION AGENT IN UTAH AS INFORMATION USERS

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INTRODUCTION

What is the role of the Cooperative Extension Service in today's information society? On May 8, 1914, the Smith Lever Act was signed creating the Cooperative Extension Service as it is known today. Section I of the Act establishes:

> In order to aid in diffusing among the people of the United States useful and practical information on subjects relating to agriculture and home economics, and to encourage the application of the same.

Today, as in the beginning, information has been the main factor underlying extension work. In the same way, the Cooperative Extension Service in Utah has been playing a very important role in the wheels of Utah development. For nearly a century, as the desert has blossomed and the state has grown, extension agents and specialists have been dispersing research-based information to the people. Yet, because of the changing demands of society, the county agent must be supported by not only specialists and researchers but also by the emerging information available.

According to the general perception, the Cooperative Extension Service is not suffering an "image crisis;" there is a positive rating of the effectiveness of this service (Holberger & Swope, 1979). However, this effectiveness depends upon a continuing analysis of an agent's knowledge including areas in which skill are needed. These skills must be gained through a variety of educational and training experiences. Because of the importance of the individual in carrying out system activities, organizational effectiveness is linked to measures of individual performance (Ladewig, 1983).

McDowell (1985) argues that for the most part, the main activity in extension is to transmit information prepared for dissemination in a meaningful way to the clientele so that it will be available to anyone who wants access. This author also concludes that the extension activities have an important role in the organizational maintenance of the land grant system. He states that the way in which information is packaged and distributed will have an effect on whether or not clients attribute the benefits received to the action of Extension and even on their perception of the value of the information. Nweke (1988) stated that: "Information is not a physical commodity but facts, data or ideas communicated for a useful purpose" (p. 421). He also identified the differences between information, data, and knowledge. Data are the raw material from which information is derivable; the main difference between data and information is that data lack structure while information has a complex structure. On the other hand, knowledge is defined as assimilated information.

In defining what agricultural information will satisfy the needs of the farmers, the public and decision makers, it is suggested that any theory of information focuses, at least in part on problem solving and decision making (Blackie & Dent, 1979). By its own nature, the Extension Service is based on these two factors. However, acquiring data to convert to applied information requires analysis and skills to put this information in the decision making and problem solving settings.

Certainly Extension's response in the information age will depend on the readiness and adaptation of the Extension structure to future changes. To address the needed changes, it is helpful to define the county agent as information user to infer or predict the specific support needed for his role in serving clients.

PURPOSE AND OBJECTIVES

The purpose of this study was to develop a profile of agricultural county agents as information users in the Cooperative Extension Service in Utah. The research questions used to address this purpose were:

1. What are the most useful information sources for agricultural county agents in Utah within the Land Grant system?
2. What are the most useful information sources for agricultural county agents in Utah within the public information sources?
3. What are the most useful information dissemination technologies used by the agricultural county agents to convey information to the clientele?
4. What is the perceived role of the agricultural county agents in relation to their clients and to Utah State University support personnel in the information process?

PROCEDURES

The target population for this study was all agricultural county agents in the Utah State Cooperative Extension Service. The term "agricultural county agent" refers to the general county agent and all the county agents who work in agricultural related areas. These areas include horticulture, irrigation, livestock, youth development, and similar specializations associated with agricultural activities. The population was taken from the list of the Cooperative Extension Service Staff Off-Campus, January 1991, published by the University Extension Department at Utah State University. The total population identified was 33 agricultural county agents.

This study was accomplished through descriptive research. Ary, Jacobs, and Razavieh (1985) describe this type of research as "the studies designed to obtain information concerning the current status of the phenomena" (p. 322). A mail survey was employed using the Total Design Method proposed by Dillman (1978). In trying to gain the respondents' trust, confidentiality was promised as well as an offer to share the results.

A questionnaire was designed by the researchers to be used in profiling the agricultural county agents in Utah as information users. The tool had four main areas. The first and second areas considered the sources of information within the land grant system and public sources. Four basic characteristics were used to rate each information source:

1. Effectiveness refers to how relevant and useful these sources of information are.
2. Validity refers to how much trust and confidence they have in these sources.
3. Frequency refers to how often these sources are used.
4. Access refers to how available and accessible these sources are.

A four point scale with 1 for low and 4 for high was used to rate each of the four characteristics. The third area of the instrument asked if the county agents were currently using available technology and, if not, if they planned to utilize it. The final area dealt with the perceived role of agricultural county agents in the information process in relation to their clients and to Utah State University.

The questionnaire was reviewed by faculty members of the Department of Agricultural Systems Technology and Education at Utah State University and extension specialists on campus to improve the content. It was then field-tested by agricultural county agents to increase reliability and face validity. A cover with questionnaire was sent on March 7, 1991. Two subsequent follow-up of non-respondents were also conducted. By April 10, 1991, a 90% response had been achieved.

Data analysis was accomplished through use of the Statistical Package for the Social Sciences. The statistical procedures used for descriptive statistics included frequency distributions, percentages, mean, median, mode, and standard deviation.

FINDINGS

Thirty of the thirty-three agricultural county agents chose to respond, yielding a response rate of 90%. Six agents majored in Agricultural Education and six in Animal Sciences. There were four county agents with Plant Science majors, three with Agronomy majors and three with Agricultural Economics majors. The remainder of the agents were graduates with a variety of majors including Horticulture, Botany, Watershed Sciences, and Range Science. Sixty percent of Utah Extension Agents had worked 10 years or less for the Extension Service. Almost one-third had worked 11 to 20 years, and 11% had worked for the Extension Service 20 years or more.

State extension specialists were perceived as the most useful information source within the land grant system (see table 1). This source ranked number one in effectiveness, validity, and frequency, and was rated second with respect to accessibility. The second most useful source of information for agricultural county agents was the cooperative extension fact sheets and newsletters followed by other county agents. The least useful information source, rated last in all four categories, was land grant university libraries followed by cooperative extension video-conferences.

Table 1: Effectiveness, Validity, Frequency and Access of Land Grant Information Sources System as Rated by Agricultural County Agents in Utah

Information Source	Effectiveness	Validity	Frequency	Access
State Extension Specialists	3.75	3.68	3.68	3.25
Other County Agents	3.50	3.35	2.83	3.22
Extension Fact Sheets/Newsletter	3.43	3.56	3.15	3.40
Area Extension Specialists	3.35	3.32	2.77	2.96
Agricultural Experiment Station	2.83	3.13	1.96	2.16
State or County Government Offices	2.61	2.80	2.09	2.54
Land Grant University Faculty	2.56	3.12	2.03	2.31
Federal Publications	2.45	3.16	2.06	2.12
Extension Video-conference	2.34	3.00	2.06	2.15
Land Grant University Libraries	1.65	2.59	1.03	1.21

* 4 Point Scale: 1= Low, 4= High

Among the of public sources of information, agents rated farm or grower organizations as the most effective and valid source, but these sources were used rather infrequently and less accessible than many other sources (see table 2). The second most useful public source of information was farmers; they were rated as the most frequently used and rated second as the most accessible and effective, although their validity received much lower ratings. Monthly and weekly publications were rated as the third most useful public source of information. They rated as the most effective, valid, and frequently used source, but their availability was rated number six. The least useful public information source rated by agricultural county agents was professional consultants in all four categories (effectiveness, validity, frequency, and access). The second least useful public source was buyer or processor representatives. Public libraries and television shared third place as the least useful public sources.

Table 2: Effectiveness, Validity, Frequency and Access of the Public Sources of Information as rated by Agricultural County Agents in Utah

Information Source	Effectiveness	Validity	Frequency	Access
Farm or Grower Organization	3.06	3.03	2.35	2.80
Farmers	2.96	2.50	2.71	3.00
Monthly or Weekly Publications	2.83	2.66	2.43	2.63
Daily or Weekly Newspapers	2.78	2.15	2.56	3.12
Professional Journals	2.65	3.21	2.06	2.00
Manufacture/Supplier Representative	2.64	2.60	2.09	2.41
State or County Government Offices	2.58	2.64	2.13	2.70
Radio	2.48	2.29	2.16	2.73
Television	2.13	1.83	1.70	1.87
Public Libraries	2.03	2.45	1.64	2.32
Buyer /Processor Representative	1.74	1.66	1.16	1.38
Professional Consultants	1.54	1.65	1.00	1.17

* 4 Point Scale: 1= Low, 4=High

Agricultural county agents rated telephones as the number one technology to disseminate information on a daily basis, with 30 respondents in that category, followed by one to one consultation, with 28, and mail with 22 respondents using them on a daily basis (see table 3). Newspapers, Cooperative Extension publications and computer software were the main dissemination technologies used on a weekly basis. The most frequently used information dissemination technologies on a monthly basis were slide shows and videotapes, with 12 respondents for each, and newspapers, with 10 respondents. Teleconferences, with 20 respondents, and radio programs, with 16 respondents, were the information dissemination technologies most used on an occasional basis. Computer (on-line networks), electronic mail and electronic bulletin boards were the most likely information dissemination technologies to be used in the future.

Table 3: Information Dissemination Technologies used by Agricultural County Agent in Utah

Information Dissemination Technology	Currently Using (number of respondents) Daily	Weekly	Monthly	Occasionally	Plan to Use? yes	no
Telephone	30	1	--	--	3	1
One to One Consultation	28	3	--	--	--	--
Recorded Phone Messages	9	--	1	1	1	5
Mail	22	2	4	2	--	--
Extension Publications	16	8	5	3	--	--
Computer Software	12	7	4	6	1	1
Newspapers	--	13	10	8	1	--
Computer (On Line Networks)	3	1	2	7	13	5
Workshops and Conferences	1	4	17	8	--	2
Radio Programs	3	2	3	16	2	7
Electronic Mail	1	1	3	6	13	5
Slide Shows	1	4	12	14	--	1
Videotapes	1	3	12	13	4	--
Television Programs	--	2	--	4	8	16
Video Conference	1	1	6	15	5	2
TeleConference	--	1	5	20	4	1
Electronic Bulletin Boards	--	--	1	3	13	4
Films	--	1	3	19	--	8

The agents were asked to rank on a 4-point scale their perceived role. Process Helper was rated number one, or the most important role. Resource Linker and Solution Giver were number two and three, respectively. The least important role was Catalyst.

CONCLUSIONS

1. The most useful information source within the land grant system for agricultural county agents was the state extension specialist. The least useful information source, rated last in all four categories, was the land grant universities library.

2. Agricultural county agents rated farm or grower organizations as the most useful public information source, but its frequency and access was low. The least useful public information source, rated by agricultural county agents, was professional consultants in all four categories (effectiveness, validity, frequency, and access).

3. Agricultural county agents rely mainly on the telephone. Most of the assessed information dissemination technologies were used on a monthly or occasional basis.

4. Utah county agents perceived themselves in the four traditional extension roles (Catalyst, Resource Linker, Process Helper and Solution Giver). The most important role in relation to Utah State University was process helper. This role was supported by findings indicating their role as liaison between client and university.

5. Those land grant and public information sources rated most effective and valid were frequently used, but they do not appear to be sufficiently accessible.

RECOMMENDATIONS

1. As the county agents indicate, it is necessary to make those information sources with high effectiveness and validity more accessible.

2. All county extension offices in Utah should be linked through a computer network (i.e., Vax system at the state level and specialized databases at the federal level), and current networking procedures should be improved.

3. The county agents should be offered an efficient and dependable system for library loans at the state and federal levels.

4. The changing environment and new information technology will demand the formation of an extension specialist position in information management, information brokering, and information dissemination technologies to assist county agents in the information process.

5. A case study or participant observation study is recommended to identify specific equipment or training needs to improve the information flow to and from the clients.

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PERCEPTIONS OF OKLAHOMA AGRICULTURAL EDUCATION TEACHERS CONCERNING SELECTED ASPECTS OF SUSTAINABLE AGRICULTURE

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INTRODUCTION

In recent years the agricultural industry has been criticized as being wasteful and harmful to the environment and the whole of society. There is also concern that rural communities and the rural way of life are slowly becoming obselete because of the lack of practices that conserve and maintain the resources needed for the production and management of agricultural products (Poincelot, 1986). As a result of these criticisms and concerns many people in the field have begun to take a closer look at the production and management practices of modern agriculturalists and have tried to develop a farming model or paradigm that will help American farmers and rural communities survive and thrive as society enters the twenty-first century.

One of the most popular, as well as controversial, farming models being lauded by agriculture professionals is that of sustainable agriculture. Most researchers and experts in the field define sustainable agriculture as a holistic agricultural management philosophy that emphasizes the application of scientific knowledge to produce acceptable long-term economic returns, protect the environment, and promote social values including human health and safety (Texas Agricultural Extension Service, 1989). Before this knowledge can be applied, however, it must be learned and accepted by those who may be in a position to use it later, specifically secondary agricultural education students.

While secondary agricultural education students may have always studied the basic cultural practices that many believe to be the basis for sustainable agriculture, the student who truly studies sustainable agriculture will view the concept as a holistic management scheme to be utilized for the purpose of improving the total farm environment. For example, one of the most important aspects of the economic impact of sustainable agriculture is rural community development and sustainability. Edwards, et.al. (1990) contended that people in rural communities are beginning to realize how agriculture and the community are interrelated and that there are ways to make the farm work for the community. Woods and Sanders (1987) noted that the relationship between agricultural and non agricultural sectors of local economies implies that agriculture depends on the rest of the economy and the economy depends on agriculture. This holistic concept is often overlooked in many traditional agricultural education programs (Plowman, 1989). Stevens (1967) noted agriculture students must not only be taught to produce, but also to realize their responsibility for promoting family welfare, farm efficiency, community survival, and societal contributions on the part of agriculturalists.

The understanding of sustainable agriculture may be of great benefit to future agriculturalists in maintaining and strengthening the agricultural infrastructure in the U.S.A. and the world (Madden, 1988). Cooper and Gamon (1991) stated:

> A knowledge of sustainable agriculture subjects is needed to ensure that each subsystem within the farm system is managed in the best way. Current and prospective agriculture students should be introduced to the application of these subjects in relation to the total farm operation (p.13).

It is for this reason that it appeared to be essential to assess the extent to which sustainable agriculture topics were being taught in secondary agricultural education classes.

PROBLEM / PURPOSE

While the subject of sustainable agriculture is currently in the spotlight of the agricultural industry, there was a lack of evidence that secondary agricultural education instructors were teaching sustainable agriculture in their classes. An assessment of the extent to which sustainable agriculture was being taught in secondary agricultural education classes was needed to determine the course of action that teachers should take to ensure that this new area of agriculture is made available to all students.

The primary purpose of this study was to determine the extent to which Oklahoma agricultural education instructors were teaching sustainable agriculture topics in their classes. A secondary purpose of this study was to assess the availability and usefulness of curricular and teaching materials in this area.

OBJECTIVES

The objectives of this study were to:

1. Determine the amount of emphasis Oklahoma Agricultural Education teachers placed on teaching sustainable agriculture topics, the classes in which they were being taught, and those in which the topics would be taught in the future.
2. Determine the perceived quality of curriculum material available to those agricultural education instructors who taught or would teach sustainable agriculture topics in their classes;
3. Determine why Oklahoma agricultural education instructors were or were not teaching sustainable agriculture topics in their classes.
4. Determine the perceived knowledge of Oklahoma Agricultural Education Teachers concerning sustainable agriculture.
5. Determine the perceived local importance of sustainable agriculture in Oklahoma communities.
6. Determine the perceived need for in-service concerning sustainable agriculture.
7. Determine the overall perceptions of Oklahoma Agricultural Education Teachers concerning sustainable agriculture.

PROCEDURES

In order to survey the utilization of sustainable agriculture concepts as topics for agricultural education classes it was first necessary to identify a representative sample of these concepts that are accepted by the agricultural industry. A primary source used to develop a list of accepted sustainable agriculture concepts and practices was a study completed by Purswell (1991) in which sustainable agriculture practices used by Oklahoma farmers and ranchers were identified. Concepts dealing with sustainable agriculture as it relates to rural community development were derived from extension factsheets and other publications pertaining to the economic effects of sustainable agriculture. The list of accepted sustainable agriculture concepts included:

Rural community development
Alternative enterprises
Animal manure fertilizer
Resistant crops
Cover crops
Organic gardening
Parasite monitoring
Water quality
Minimum or non-tillage
Rural population sustainability
Alternative power
Integrated pest management
Wildlife management
Range and brush control
Compatible crops
Pasture rotation
Fallow ground
Crop rotation

Strip cropping
Green manure crops
Soil erosion control
Contour farming
Drip irrigation
Mulching

These concepts and practices were categorized into five groups for use in gathering more general information concerning teachers' perceptions. These groups were: Conservation practices, Environmental concerns, Alternative enterprises, Rural development, and Integrated pest management.

Upon completion, the list was audited by the Oklahoma State University Department of Agricultural Education, Oklahoma State University extension specialists, and a randomly selected group of agricultural education teachers. Additions and corrections were made based on the review of these individuals.

A researcher developed instrument was utilized to gather tha data necessary for the conduct of this study. Sixteen items were developed to address each of the objectives set forth in the study. Items included both quantitative and qualitative responses to gather data concerning demographics, courses and topics taught, and attitudes and perceptions regarding sustainable agriculture. Content validity and reliability estimates were made based on the results obtained after piloting the instrument on a random sample of agricultural science teachers in Texas.

The population for this study included all secondary Agricultural Education instructors in the state of Oklahoma. The entire population (446 teachers) was surveyed. Survey instruments were distributed to agricultural education teachers at the District Chapter Officer Leadership Training Conferences held across the state of Oklahoma. Follow-up mailings were conducted to gather information from those teachers not attending the conferences. A total of 368 (82.51%) teachers responded. T-tests and Chi-square procedures were utilized to determine no significant difference between early and late respondents.

ANALYSIS OF DATA

Descriptive statistics, frequencies, and percentages were computed to ascertain the current standing of sustainable agriculture in secondary agricultural education programs in Oklahoma. Means and standard deviations were computed for all scaled response items. Items upon which teachers responded qualitatively were analyzed by categorizing responses and computing frequencies and percentages. Pearson Product-Moment correlation was used to determine the relationship between knowledge and comfort level concerning the teaching of sustainable agriculture.

RESULTS

The overall amount of emphasis placed on teaching sustainable agriculture topics, illustrated in Table I, was observed to be mostly moderate. Of the twenty-three topics listed, only six were shown to be given high emphasis by teachers. These six topics were alternative enterprises, rural community development, pasture rotation, range and brush control, water quality, and soil erosion. Only one of the topics listed, drip irrigation, was shown to be given low emphasis by teachers.

Teachers were asked to identify the sustainable agriculture topics they would most likely teach in specific courses. A summary of the responses to this item is presented in Table II. In the Agriculture I course the topic most frequently identified as being taught was alternative enterprises. Cover crops was identified by teachers as a topic which would be taught in the Agricultural II course. Teachers identified pasture rotation as a topic that would be taught in the Production Management I course. In the Production Management II course the topic most frequently identified was resistant crops. Wildlife management was identified most frequently in the Forestry and Natural Resources courses as the sustainable agriculture

Table I

Mean Emphasis Placed by Teachers Upon Selected Sustainable Agriculture Topics

Topics	Mean	SD	Interpretation
Water Quality	3.15	.84	High
Soil Erosion	3.15	.80	High
Pasture Rotation	2.77	.86	High
Alternative Enterprises	2.63	.94	High
Range/Brush Control	2.62	.94	High
Rural Community Development	2.61	.90	High
Parasite Monitoring	2.35	.94	Moderate
Cover Crops	2.17	.89	Moderate
Compatible Crops	2.13	.86	Moderate
Rural Population Sustainability	2.09	.97	Moderate
Integrated Pest Management	2.04	.84	Moderate
Contour Farming	2.04	.88	Moderate
Minimum/No Till	2.01	.92	Moderate
Animal Manure Fertilizer	1.98	.83	Moderate
Mulching	1.97	.87	Moderate
Resistant Crops	1.93	.84	Moderate
Crop Rotation	1.85	.80	Moderate
Strip Cropping	1.81	.82	Moderate
Organic Gardening	1.80	.86	Moderate
Fallow Ground	1.74	.80	Moderate
Alternative Power	1.62	.77	Moderate
Green manure Crops	1.59	.74	Moderate
Drip Irrigation	1.44	.67	Low

(Scale: 1 = Low; 2 = Moderate, 3 = High, 4 = Extreme)

Table II

Most Frequently Identified Sustainable Agriculture Topics That Would be Taught in Specific Agricultural Education Courses

Course / Activity	Topic Most Frequently Identified	N = 368	
		N	%
Natural Resources	Wildlife Management	270	(73.37)
Production Management I	Pasture Rotation	144	(39.13)
Agriculture II	Cover Crops	137	(37.23)
Horticulture I	Organic Gardening	123	(33.42)
Agriculture I	Alternative Enterprises	79	(21.47)
Production Management II	Resistant Crops	78	(21.20)
Horticulture II	Organic Gardening	34	(9.24)
8th Grade Agriculture	Alternative Enterprises	34	(9.24)
Agricultural Sales and Service	Rural Community Development	21	(5.71)
Employment in Agribusiness	Rural Population Sustainability	19	(5.16)
Agricultural Mechanics I	Alternative Power	16	(4.35)
Agricultural Products & Mktng.	Alternative Enterprises	16	(4.35)
Agricultural Mechanics II	Alternative Power	15	(4.08)
Ag. Career Orientation	Rural Population Sustainability	15	(4.08)

Table II Continued

Course / Activity	Topic Most Frequently Identified	N = 368	
		N	%
Forestry	Wildlife Management	12	(3.26)
Equine Management	Alternative Power	10	(2.72)
FFA	Rural Population Sustainability	23	(6.25)
SAE	Alternative Enterprises	10	(2.72)

topic that would most likely be taught in those courses. In the Agricultural Mechanics I and II.courses alternative power was identified most frequently as being the sustainable agriculture topic that would most likely be taught. Organic gardening was identified most frequently as being the sustainable agriculture topic that would most likely be taught in the Horticulture I and II courses. In the 8th Grade Agriculture course alternative enterprises was identified by teachers as being a topic that would be taught in that course. Alternative power was identified by teachers as being that topic that would most likely be taught in the Equine Management course. In the Agricultural Sales and Service course teachers identified rural community development as the topic that would most likely be taught in that course. Alternative enterprises was identified by teachers as the topic that would most likely be taught in Agricultural Products and Marketing. Rural population sustainability was identified most frequently as being the topic that would be taught in Employment in Agribusiness, Agricultural Career Orientation, and as a part of the FFA program. Finally, alternative enterprises was identified as being the topic that would most likely be taught as a part of the SAE program.

When asked to rate the adequacy of curriculum material for teaching sustainable agriculture concepts teachers indicated that for most concepts it was fair. One sustainable agriculture concept, conservation practices, was rated as being good in the current curriculum material. Integrated pest management, on the other hand, was rated as being poor in the current curriculum material.

Teachers were asked whether or not they would teach or had taught sustainable agriculture topics in their classes. Those who indicated that they had taught or would teach these topics were asked to select, from a list of responses, those reasons that influenced them to teach sustainable agriculture topics in their classes. Of the 368 teachers responding to the survey, 178 (48.37%) stated that they had taught sustainable agriculture because of a personal interest in the area. The next most frequently identified reasons for teaching sustainable agriculture topics were student interest and economic importance with 128 (34.78%) and 127 (34.51%) teachers responding respectively. Personal experience was cited by 110 (29.89%) teachers as the reason that they chose to teach sustainable agriculture topics in their classes.

The teachers who indicated that they had not or would not teach sustainable agriculture topics in their classes were also asked to identify reasons for this decision. Of the teachers surveyed, 68 (18.48%) indicated that they would not or had not taught sustainable agriculture topics because of a lack of curriculum material available on the subject. Lack of student interest was cited by 50 (13.59%) as being the reason for not teaching sustainable agriculture topics. Forty-seven (12.77%) teachers cited lack of personal interest as the reason for not teaching or planning to teach sustainable agriculture topics. Finally, personal experience was indicated by 38 (10.33%) as the reason for not teaching sustainable agriculture topics.

Teachers were asked to provide reasons, in an open-ended question, for why they did or did not think it was important for students to learn sustainable agriculture. Of the 106 teachers who chose to respond to this item, 25 (23.58%) provided positive environmental responses, 15 (14.15%) positive economic responses were listed, 50 (47.17%) provided positive social responses, 3 (2.83%) gave negative social responses, and 13 (12.26%) gave positive miscellaneous responses.

In order to determine the perceived knowledge level of teachers in sustainable agriculture topics, teachers were asked to rate their knowledge in five broad areas that were identified as being related to sustainable agriculture. Teachers rated their knowledge below average in only one area, integrated pest management. Knowledge in all other areas was rated as average.

Teachers were also asked to rate their comfort level in teaching topics in the various sustainable agriculture areas. Respondents rated their comfort level to be very uncomfortable in the area of integrated pest management and uncomfortable in the area of rural development. Teachers stated that they would be comfortable teaching in the areas of alternative enterprises, conservation practices, and environmental concerns. A Pearson Product Moment correlation confirmed a correlation of .93 between knowledge level and comfort level. Figure I provides a graphic depiction of this relationship.

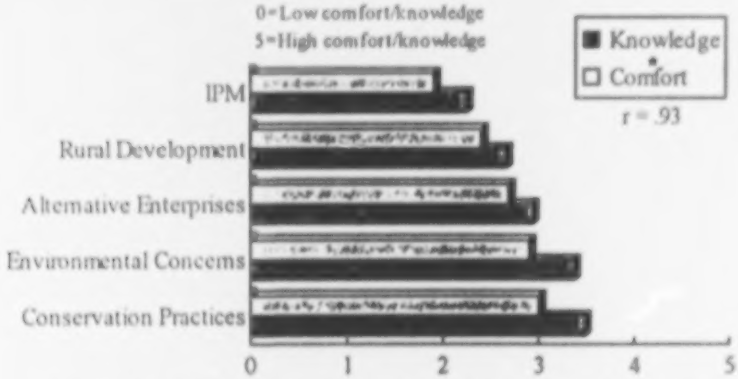

Figure I: Relationship Between Knowledge of and Comfort Level for Teaching Sustainable Agriculture Topics

Teachers were asked to identify sustainable agriculture practices commonly used by farmers in their respective areas. The six most frequently identified sustainable agriculture practices used by farmers were soil erosion control, soil testing, livestock parasite monitoring, pasture rotation, range and brush control, and wildlife management.

Teachers were asked to rate the need for in-service on the five identified sustainable agriculture subject areas of integrated pest management, rural development, alternative enterprises, conservation practices, and environmental concerns. All subject areas were rated as having a moderately high need for in-service with the exception of integrated pest management which was rated as only having a moderate need.

Teachers were also asked to identify the specific sustainable agriculture production practices over which in-service was needed. Water Quality, wildlife management, livestock parasite monitoring, soil testing, range and brush control, soil erosion control, and integrated pest management were the practices identified by teachers as being those over which in-service was needed.

In order to determine teachers' overall perceptions about sustainable agriculture they were asked to respond to an open ended question concerning their personal opinion of the sustainable agriculture movement. Responses were first categorized by their positive or negative nature. Responses were then grouped into one of four categories, environmental responses, economic responses, social responses, and miscellaneous responses. A total of 87 teachers chose to respond to this item. In the positive environmental category 12 (13.79%) of the 87 respondents gave their opinions. Two (2.30%) teachers responded in the negative environmental category. Positive economic responses were given by 14 (16.09%) of the teachers responding. Negative economic responses were given by 3 (3.45%) teachers. Twenty-five (28.74%) teachers listed opinions that could be categorized as positive social responses and 3 (3.45%) gave negative social responses. In the positive miscellaneous category 22 (25.29%) teachers provided opinions and 6 (6.90%) responded in the negative miscellaneous category. Figure II provides a graphic depiction of these response categories.

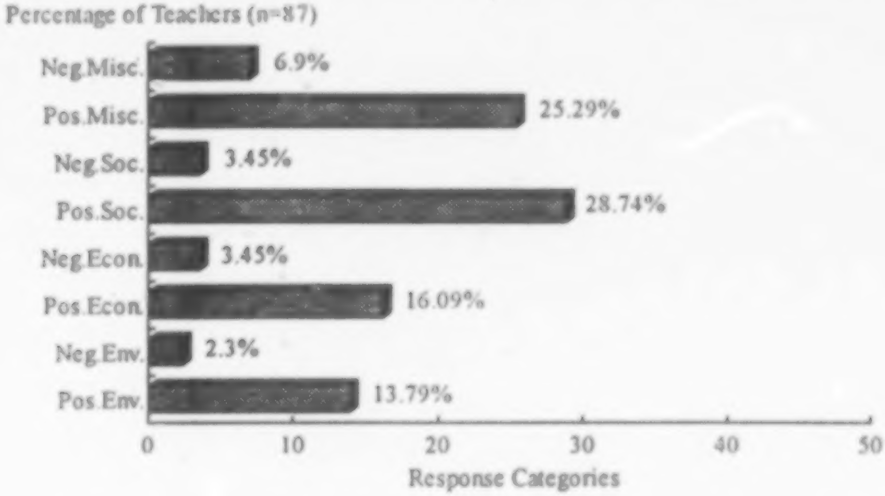

Figure II. Responses Concerning Teachers' Opinions of Sustainable Agriculture by Selected Category

CONCLUSIONS AND/OR RECOMMENDATIONS

It was concluded:

1. That teachers taught a variety of the courses offered in the Agricultural Education programs in Oklahoma, but tended to more often teach those courses that could be considered traditional and/or production based.

2. That teachers emphasized those sustainable agriculture topics that could be considered more traditional since many stated that they had always taught the topics, just not under the title of sustainable agriculture. Examples of this can be seen in Table II. Most of the sustainable agriculture topics were viewed by teachers as being best suited to the production oriented courses and an effort should be made to in-service teachers on ways to integrate the teaching of these topics into courses in which they have not traditionally been taught.

3. That curriculum material dealing with sustainable agriculture was, in the eyes of the teachers, mostly fair at best and that more curriculum material dealing with sustainable agriculture should be developed. It was further concluded that teachers were somewhat unwilling to teach topics that are not specifically covered in the core curriculum material for a particular course and should be provided in-service on procurement and use of outside resource material on sustainable agriculture.

4. That teachers generally believed that sustainable agriculture should be taught to secondary Agricultural Education students because of personal interest of the teacher, student interest, and economic importance. The main reason that teachers would not teach sustainable agriculture was concluded to be a lack of quality curriculum material over the subject. It was further concluded that teachers believed that the importance of sustainable agriculutre was due to the impact that the movement would have on societal and environmental concerns of the agricultural industry.

5. That teachers perceived their knowledge of sustainable agriculture to be average in all areas with the exception of integrated pest management and that they would feel comfortable teaching topics in all areas except rural development and integrated pest management. In-service should be provided in these areas.

6. That teachers perceived that some sustainable agriculture practices were being utilized by the majority of producers in the state. It was further concluded that most of the sustainable practices identified as being important were viewed, by teachers, as those practices that had always been done to meet the demands of a particular enterprise. Materials should be developed to show the wide variety of sustainable agriculture practices that may be used by producers.

7. That teachers were interested in participating in in-service training covering those topics with which they already felt comfortable and perceived their knowledge level to be average. It was further concluded that teachers felt a need for in-service over those sustainable agriculture practices that were commonly used by Oklahoma producers.

8. That teachers generally had a positive opinion of sustainable agriculture, but were somewhat pensive about the long-range value of all of the views and practices included under the sustainable agriculture concept.

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MICHIGAN AGRICULTURAL ISSUES

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INTRODUCTION

The production of food and fiber for humankind has traditionally been a concern for all individuals. Prior to monumental advances in product output made this past century, almost every person was actively involved in decisions that directly affected their attainment of food and clothing necessary for survival. Production of these essential items has been channeled to a small number of high-output individuals. Due to production agriculturalists' efficiency modern American consumers only spend 16 percent of their disposable income for food (1985 Yearbook of Agriculture).

Currently in the state of Michigan only two percent of the work force is actively involved in farming. Four-fifths of the working population has been non-farm for over thirty years (Mawby, cited in Douglass, 1985). At the national level similar trends exist. As time and technology continue to widen the gap between production agriculturalists and consumers, consumers have, and will become, more removed from decisions used to operate the production system. Today, peoples' concerns still include how they will fulfill their food and clothing needs; however, greater product supply has given them the time and opportunity to make choices on other issues.

Of the time spent by modern consumers on decisions relative to food and fiber issues, a greater proportion of it is focused on special concerns not directly related to their attainment. Consumers are not only concerned that they can purchase enough products and the types which they prefer, but also that practices that lead to these products are humane and environmentally safe. "..., while the food supply in this country is recognized as high quality, concerns continue to grow about microbial and chemical contamination. The U.S. food and agricultural system is challenged to provide food that is nutritionally balanced, safe, convenient, and affordable." (ESCOP Planning and Budget Subcommittee, 1991). As fewer people become directly involved in production agriculture it is up to individuals within the agricultural system to educate the public about the food and fiber system. Such education is critical so consumer decisions, which may affect the entire agricultural system, are well informed and beneficial for all people.

The identification of issues relevant to the operation of an enterprise is vital to the enterprise's success (Campbell, 1983). Issue identification serves as the first step of a process known as issue management (Chase, 1977) which enables an enterprise to focus its resources in order to meet its long term objectives. Suppose the long term objective of agriculture is to ensure an adequate supply of food and fiber at reasonable cost to consumers while allowing producers sufficient economic stability. Such an objective implies that both agricultural production groups and consumers have the opportunity and responsibility to set the agenda that guides the future direction of agriculture. Issues identified by each group should help write this agenda.

Previous research that identified problems and critical issues in Michigan agriculture involved two groups, Michigan State University Cooperative Extension Service (CES) agents and members of commodity groups (Schwartzweller, 1991). These groups are directly involved with agriculture and understand its importance in Michigan. Cooperative Extension agents often serve as liaisons between agricultural producers and consumers, and, therefore, tended to highlight issues most likely to cause tension between producers and consumers if not resolved. Conversely, producers, as members of commodity groups, listed an issue that is directly related to the profitability of their farms for each of their top five issues. Both Extension agents and producers were concerned about issues which directly affected the success of their occupations.

Issues identified for research are broader in scope than are those listed by CES agents and commodity groups. The Michigan Department of Agriculture (MDA) and the State Agriculture Experiment Stations (SAESs) have prioritized agricultural issues in relation to research needs of the state and nation, respectively (ESCOP Planning and Budget Subcommittee, 1991 and Futures Team, 1990). Objectives of these groups were to enhance overall productivity of foodstuffs while ensuring environmental preservation and human safety. With such goals, these agencies probably identified issues that are of greater appeal to consumers than those recognized by the agricultural groups.

Agriculture is a tremendously diverse enterprise. Achieving a unified voice to obtain a single list of critical issues that face the industry may be an impossible task. Issues of future importance to agriculturalists may not be solely based on product output or market price, but more on the ability to satisfy the desires of the people agriculture has freed, the consumers. If only people within agriculture identify issues they may miss what consumers need and want. Susan K. Harlander, Department of Food Science and Nutrition, University of Minnesota, discovered this in one of her first biotechnology talks, "Obviously, the technical and scientific information that I felt most comfortable discussing were not issues of utmost concern to that audience." Agriculturalists need to identify what their audience, the consumer, wants and focus attention towards those matters.

PURPOSE AND OBJECTIVES

The primary purpose of the study was to identify concerns of Michigan people as they relate to the environment, food production and consumption, the use of Michigan land (forests, state parks, shorelines, etc.), pollution, and international food trade. Objectives of this study were to identify consumer-type agricultural issues that are of concern to Michigan people and to ascertain differences and similarities between issues identified by consumers and issues identified from agricultural research.

PROCEDURES

Population

The population for the study was the people of Michigan as identified by Survey Sampling, Incorporated of Fairfield, Connecticut. This company was recommended by the Michigan State University Center for Survey Research (CSR).

Sample Selection

Survey Sampling, Inc. randomly selected 300 Michigan residents. From this population the researcher systematically randomly selected 150 people. Systematic random sampling is when all members in the defined population are placed on a list for random selection, and e.g., every sixth person chosen after a random starting place is selected (Ary, et al., 1990). The sample was again systematically randomized to determine the sample for each of the Delphis.

Seventeen (17) Michigan residents agreed to participate in the three-stage Delphi. Of that seventeen, fourteen (14) respondents consistently returned their questionnaires.

Twenty-three (23) Michigan residents agreed to participate in the four-stage Delphi. Of that 23, 19 respondents consistently returned their completed questionnaires.

Fifteen (15) respondents were determined to be sufficient for reliable results by Martino (cited in Heath et al., 1988). However, thirty (30) respondents were determined to be sufficient by Delbecq et al. (cited in Delp et al., 1977).

Instrumentation

Two Delphis were conducted, a three-stage and four-stage. The three-stage Delphi participants were presented twenty issues as identified from literature. The issues in the literature were listed and tabulated to identify issues that were identified most often by various agricultural groups. The four-stage Delphi participants identified their own twenty concerns. Utilization of two Delphis allowed comparison of issues identified by consumers and issues identified from research, which has previously not included consumers.

The first questionnaire for the three-stage (research-identified) Michigan Issues Delphi was developed using research articles related to consumer issues. The first questionnaire for the four-stage (consumer-identified) Michigan Issues Delphi study was developed by following the recommended Delphi procedure (Delp et al., 1977). In the four-stage Delphi the first questionnaire used an open-ended statement to generate a list of issues. This first step is recommended because it allows participants time to think and reflect, and avoids undue focusing on particular ideas. The questionnaires that followed (numbers two, three and four) were developed by grouping like-responses from the prior questionnaire. The goal was for the respondents to come to a consensus on the twenty issues.

A Likert-type questionnaire design was used in questionnaires one and two (three-stage, research-identified) and questionnaires two and three (four-stage, consumer-identified) that measured respondents' opinions towards Michigan consumer issues. For questionnaire number one (three-stage) and number two (four-stage) the respondents' rating indicated the degree of importance they gave an issue. For questionnaire number two (three-stage) and number three (four-stage) the respondents' rating indicated the level of agreement they had for the issue. As the study progressed, the final questionnaire (questionnaire number three or four) was a dichotomous disagree/agree instrument.

Data Collection

Mail questionnaires were used to collect data. The explanatory letter explained the Delphi process, indicated the importance of the data, assured confidentiality, requested participation, included a stamped postcard for acceptance or non-acceptance, and offered a summary of results upon request. It is crucial that the letters and questionnaires be well prepared because there is no individual contact with the Delphi technique (Delbecq, et al., 1975).

A number coded questionnaire along with a cover letter and return envelope were mailed during the spring of 1992 to the Delphi sample groups. Telephone follow-ups (dunning) were made to non-respondents. Two or three more questionnaires were mailed to the three-stage and four-stage participants, respectively. The mailing dates for the second, third and fourth questionnaires followed a typical Delphi time line (47 day process).

ANALYSIS OF DATA

Each questionnaire required different analyses. Questionnaire number one for the four-stage Delphi was analyzed by sorting responses by issues. Like-issues were grouped. Issues having the largest number of responses constituted the list of issues for questionnaire number two.

Questionnaire number one (three-stage) and number two (four-stage) were analyzed by using descriptive statistics. This questionnaire consisted of twenty issues. Each issue was ranked by the respondents on a four-point Likert scale. The four points were identified as 1 = not important, 2 = low importance, 3 = very important, and 4 = extremely important. The mean importance ranking was determined using SPSS/PC+. Using the mean, the issues were ranked by importance for questionnaire number two (three-stage) and questionnaire number three (four stage). From comments made by respondents the issue statements were generated for questionnaire number two (three-stage) or number three (four-stage).

Questionnaire number two (three-stage) and number three (four-stage) were analyzed using descriptive statistics. Each issue statement was ranked by the respondents on a four-point Likert scale. The four points were identified as 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree.

Questionnaire number three (three-stage) and number four (four-stage) were designed to have respondents come to consensus on the issue statements. The issue statements were presented on a dichotomous scale, the respondents either disagreed or agreed with the statement. Frequencies were the descriptive statistics used for this questionnaire.

RESULTS

A summary of the objectives that guided the research process are followed by selected major findings.

Objective 1: To identify consumer-type agricultural issues that are of concern to Michigan people.

1. The three-stage Delphi (research-identified) participants ranked saving farmland, property taxes, food safety, use of Michigan land, and groundwater as the top five issues. These issues were originally identified for them via literature research (see Table 1).
2. The top five issues identified in the four-stage Delphi (consumer-identified) included the Michigan education system, disposal of nuclear and chemical wastes, drinking water, toxic waste, and landfills. These issues were identified by the respondents (see Table 2).

Objective 2: To ascertain the differences and similarities between issues identified by consumers and issues identified from research.

1. There were differences among issues identified from research (three-stage Delphi) and issues identified by consumers (four-stage Delphi). The three-stage Delphi had 11 issues that were not identified by the consumers. The 11 issues were use of Michigan land (emphasized natural sites of beauty), attracting tourists, understanding how food moves from producer to your table, organic farming, Greenhouse effect, lawn pesticide use, disposal of animal wastes as it relates to food production, international food trade, genetic engineering, animal rights/welfare, and acid rain.

The four-stage Delphi participants identified 11 issues that were not in the top twenty issues identified by research. The 11 issues are Michigan economy, water pollution, disposal of nuclear and chemical waste, Michigan educational system, state parks, toxic waste, maintenance of Michigan roads, logging of Michigan woodlands, contaminated freshwater fish, use of Michigan land (four-stage emphasized land use planning), and abandoned oil wells/drill sites.

2. There were nine similar issues identified by research and by the consumers. The nine issues were saving farmland, air pollution/quality, recycling, landfills, agricultural pesticide (chemical) use, wetlands, groundwater/drinking water, food safety and property taxes.

CONCLUSIONS AND/OR RECOMMENDATIONS

1. The three-stage Delphi issues more closely resemble issues identified by CES, commodity groups, MDA, and SAESs due to the initial identification of issues coming from the literature.
2. The four-stage Delphi issues are consumer-identified issues that differ from issues identified by CES, commodity groups, MDA, and SAESs. Because agriculturalists serve the consumer we should educate them on their concerns and, if deemed important, on issues identified by agricultural groups.
3. It is necessary to take a critical look at the influence of commodity groups on agriculturally-related research. From the four-stage Delphi it is evident that consumers are not interested in the same issues as commodity groups. Commodity group focus tends to be on economic issues directly related to production, whereas consumer focus is on environmental concerns and education.

Based on findings of the study the following recommendations were made:

1. Further research should be conducted with each critical issue identified by the four-stage Delphi study and a plan developed to address the needs.
2. Because agriculturalist identified issues differ from consumer identified issues, the agricultural community should continually include the consumers in identifying research issues.
3. The agriculturalists need to address the general public's agricultural/natural resources concerns and because agriculturalists serve the consumer we should educate them on their concerns and, if deemed important, on issues identified by agricultural groups. Agricultural education at all levels is one way to address this recommendation.

Table 1

Three-stage Delphi: Questionnaire #3 - Levels of Agreement

Issue Statement	Disagree (N)	%	Agree (N)	%
1.*** Farmland must be preserved now and in the future.	1	7.1	13	92.9
2.*** Property tax reform should be introduced	1	9.1	10	90.9
3.** Food safety should be improved even if it means higher food prices.	7	50.0	7	50.0
4.** It is important to maintain Michigan lands as natural sites of beauty for MI natives and tourists.	1	7.1	13	92.9
5.** Groundwater quality may be a more serious problem than currently believed because of insufficient knowledge.	3	21.4	11	78.6
6.** Michigan should increase air quality through government regulation.	9	64.3	5	35.7
7.** Recycling programs within MI should be more uniform.	3	21.4	11	78.6
8.** Michigan should research possible permanent alternatives to landfills.	3	21.4	11	78.6
9.** Michigan needs to increase efforts to promote tourism.	3	21.4	11	78.6
10.** Michigan farmers should decrease their use of pesticides.	3	21.4	11	78.6
11.** Educational programs should be created to inform consumers about how food is produced.	10	76.9	3	23.1

*** Extremely important issue ** Very important issue

Table 2
Four-stage Delphi: Questionnaire #4 - Levels of Agreement

Issue Statement	Disagree (N)	%	Agree (N)	%
1.*** Michigan can be proud of its K-12 grade educational system.	13	72.2	5	27.8
2.*** Processes that generate nuclear wastes should be banned because the wastes cannot be disposed of properly.	12	66.7	6	33.3
3.*** Currently, MI has good,pure drinking water	5	27.8	13	72.2
4.*** The methods of toxic waste disposal are adequate; the problem lies with communication.	14	82.4	3	17.6
5.** Michigan should research possible alternatives to landfills	0	0	18	100.0
6.** Recycling programs within MI should be more uniform.	1	5.6	17	94.4
7.** The water pollution we acknowledge is only a small part of the real problem.	1	5.9	16	94.1
8.** Michigan's economy must begin to rely on other areas besides the automobile industry.	0	0	18	100.0
9.** Property tax reform measures should be introduced.	0	0	18	100.0
10.** Farmland must be preserved in order to have food now and in the future.	2	11.1	16	88.9
11.** Well maintained roads are worth paying for.	0	0	17	100.0

*** Extremely important issue ** Very important issue

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SELECTED CHARACTERISTICS OF PRESERVICE AGRICULTURAL TEACHERS IN MONTANA

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INTRODUCTION

Every student is unique in their own way, including the way they learn. The characteristics of students' teachers are just as diverse as those of the students. Research suggests that the learning style, teaching style, and personality style of teachers have implications for student learning (Garger & Guild, 1984). Studies have investigated the selected teacher characteristics of learning style (Avery, 1985; Jacobs, 1990; Witkin, 1973), teaching style (Dunn & Dunn, 1979; Witkin, 1973; Gregorc, 1979; Koppleman, 1980), and personality style (Lawrence, 1984; Myers & Myers, 1989; DeNovellis & Lawrence, 1983). However, Cano, Garton, and Raven (1991) concluded that despite the amount of related research regarding learning styles, teaching styles, and personality styles, agricultural teacher educators may be unable to fully utilize the results because agricultural teachers were not included in the samples of previous research.

Individuals have the basic capability to learn and teach; however, they are not able to learn and teach effectively in the same exact way (Gregorc, 1979). Dunn and Dunn (1979) cited that not only do students learn in considerably different ways, but certain students succeed only through selected methods. Traditionally, agricultural education has relied on the problem-solving approach for classroom instruction. The question that arises is how does the use of problem-solving interact with learners' and teachers' characteristics? Ronning, McCurdy, and Ballinger (1984) argued that problem-solving must consider at least three dimensions: knowledge domain, problem-solving methods, and characteristics of learners. Ronning et al. (1984) contended that the first two dimensions are now widely accepted as essential for problem-solving, but there were no theories of problem-solving which took into account systematic individual differences. Ronning et al. (1984) concluded that modification of problem-solving instruction in ways consistent with students' learning styles seems an inevitable consequence. One dimension not considered by Ronning et al. (1984) was the characteristics of the teachers.

Before the relationship between problem-solving and teacher characteristics is investigated it must be first determine if there are differences among agricultural teachers on these selected characteristics. Cano et al. (1991) found in a study of Ohio preservice agricultural teachers that there were differences in learning styles, teaching styles, and personality styles of the subjects. However, the study was limited to one state and the authors commented there was need for additional research concerning possible differences in the characteristics of preservice agricultural teachers.

THEORETICAL FRAMEWORK

Learning Style: In considering learning styles, the influence the surrounding field has on a person's perception of items within the field as well as its impact on the person's intellectual domains and personality traits have been extensively studied. Witkin (1973) has shown that a person who's mode of perception is strongly dominated by the surrounding field is said to be leaning towards a field-dependent learning style. A person who perceives items as more or less separate from the surrounding field leans toward a field-independent learning style.

Individuals with a field-dependent learning style tend to perceive the world in a global fashion. Field-dependent learners are socially oriented and best learn material within a social content. Field-dependent learners require externally defined goals and must be provided with organization. Consequently, they may need more explicit instruction in problem-solving strategies. As teachers, field-dependent learners tend to use student centered activities. They are strong in establishing a warm and personal learning environment. Teachers that are field-dependent are also less likely to provide negative feedback and evaluation towards the student.

Field-independent learners view the world more analytically. Field-independent learners rely on self-defined goals and self-structure situations. Teachers with a field-independent learning style are more subject-centered in their instruction. Field-independent teachers serve more as a "guide" than a "teacher" for their students. Field-independent teachers place more emphasis on the cognitive aspect of instruction. They are more likely to use an inquiry or problem-solving approach to learning due to their analytical perspective.

Teaching Style: Van Tilburg and Heimlich (Heimlich, 1990), in an attempt to describe an individual's teaching style, defined two domains, sensitivity and inclusion. The sensitivity domain is based on the ability of the teacher to sense the shared characteristics of the group of learners. The inclusion domain is based on the teacher's willingness and ability to utilize instructional strategies that take advantage of the group's characteristics. An individual can be classified into one of four teaching styles based on their sensitivity and inclusion scores.

The low inclusion and low sensitivity quadrant is labeled "expert". The "expert" teacher is subject oriented and tends to use the lecture method of instruction. Teachers scoring in the low inclusion and high sensitivity quadrant are termed "providers". "Providers" are learner centered and seek to teach effectively. "Providers" tend to use group discussion, demonstrations, and guided activities. The quadrant defined by high inclusion and low sensitivity is labeled "facilitator". Teachers falling into this category are teacher-centered and the method of instruction is dictated by the subject matter. Teachers in the final quadrant with scores of high inclusion and high sensitivity are "enablers". "Enablers" are very learning-centered as the learners define both the activity and the process in the learning environment.

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Personality Style: The Myers-Briggs Type Indicator (MBTI), a measurement of differences in personality style, has also been used in learning style assessment (Lawrence, 1984; Sugarman, 1985) and teaching style prediction (Myers & Myers 1980; Hoffman & Betkouski, 1981). The MBTI reports an individual's preferences on four scales. The four scales are Extraversion-Introversion Scale (EI), Sensing-Intuition Scale (SN), Thinking-Feeling Scale (TF), and Judgement-Perception Scale (JP). The EI scale describes whether an individual likes to focus his/her attention on the outer or inner world. The SN scale describes how an individual perceives or acquires information - do they use their senses or do they rely on intuition? The TF scale describes how the individual makes decisions or judgements about something either through thinking or feeling. The JP scale describes how an individual orients himself/herself to the outer world by taking primarily a judging attitude or a perceptive attitude.

PURPOSE AND RESEARCH QUESTIONS

The purpose of this study was to determine the learning style, teaching style, and personality style of preservice agriculture teachers in the Department of Agricultural and Technology Education's methods course at Montana State University (MSU). The following research questions were used to guide this investigation:

1. What was the gender and age of preservice agricultural teachers at MSU?
2. What was the preferred learning style of preservice teachers as measured by the Group Embedded Figures Test (GEFT)?
3. What was the preferred teaching style of preservice teachers as measured by the Van Tilburg / Heimlich Teaching Style Preference Inventory (VHTSP)?
4. What was the preferred personality style of preservice teachers in agricultural and technology education as measured by the Myers-Briggs Type Indicator (MBTI)?

METHODS

The population for this descriptive study was preservice agriculture teachers in the Department of Agricultural and Technology Education at Montana State University. The sample (n=18) was junior and senior preservice agriculture teachers enrolled in the department's methods of teaching course during the Fall Semester of 1991.

The GEFT was administered to determine the preferred learning style of the subjects as either field-dependent or field-independent. The GEFT is considered a standardized instrument and has been tested for validity and reliability (Witkin, Oltman, Raskin, & Karp, 1971).

The VHTSP was used to ascertain the subjects' preferred teaching style. Although the VHTSP has not been standardized, it has been tested for reliability and validity by its authors (Heimlich, 1990) and has been used extensively providing valid and reliable results.

The MBTI Form G was used to assess the personality type of the subjects. The MBTI is also considered a standardized test that has been tested for validity and reliability (Myers, 1962).

All instruments were administered at the beginning of the Fall Semester in 1991. The instruments were administered by one of the researchers during class sessions. All instruments were hand scored by the researchers and the data were analyzed using SAS.

RESULTS AND CONCLUSIONS

The results indicated that there were 64% males (11) and 36% females (7) enrolled in the course (Table 1). Two-thirds of the males were non-traditional age students (25 years or older) while over three-fourths of the female students were traditional age (less than 25 years of age). Overall, approximately half the subjects were traditional age students and half were non-traditional age.

Table 1. Gender and Age of Preservice Teachers (n=18)

	Males		Females		All Cases	
Age (in years)	f	%	f	%	f	%
Traditional (<25)	4	36.4	6	85.7	10	55.6
Non-traditional (≥25)	7	63.6	1	14.3	8	44.4
Total	11	100.0	7	100.0	18	100.0

Data showed that 67% (12) of the subjects were field-independent learners and 33% (6) were field-dependent learners (Table 2). Just over half (6) of the males were field-dependent, while all of the females were field-independent. The mean GEFT score for all subjects was 12.4 which is higher than the national norm of 11.3. This is due to the mean GEFT score of the females (15.3) which is higher than the national norm for females of 10.8. The tendency for females to be more independent than male subjects is opposite to what the literature would suggest (Witkin, et al., 1971). However, Cano et al. (1991) in their study of Ohio preservice teachers also found that females tended to be more field-independent than males.

Table 2. Preferred Learning Styles of Preservice Teachers by Gender (n=20)

Learning Style	Males f	Males %	Females f	Females %	All Cases f	All Cases %
Field-Dependent	6	54.5	0	0.0	6	33.3
Field-Independent	5	45.5	7	100.0	12	66.7
Total	11	100.0	8	100.0	18	100.0

Teaching style results indicated that subjects mostly preferred a learner-centered approach to teaching (Table 3). The data showed that 95% (17) of the preservice teachers preferred the "enabler" teaching style. Just 5% (1) subject, a male, preferred the "provider" teaching style. No subjects preferred the "expert" style or the "facilitator" style. Cano et al. (1991) in their study of Ohio preservice teachers also found that the majority of subjects preferred a learning-centered teaching style. The results of this study indicate that the students are very learning-centered and wish to involve learners in defining both the activity and the process in the learning environment.

Table 3. Teaching Style Dimensions of Preservice Teachers (n=20)

Teaching Style Dimensions	Males f	Males %	Females f	Females %	All Cases f	All Cases %
Expert	0	0.0	0	0.0	0	0.0
Provider	1	9.1	0	0.0	1	5.6
Facilitator	0	0.0	0	0.0	0	0.0
Enabler	10	90.9	7	100.0	17	94.4
Total	11	100.0	7	100.0	20	100.0

Cano et al. (1991) noted that even though the majority of subjects were field-independent, the field-independent characteristic of being subject-centered was not evident. In this study there was a greater majority of field-independent learners and even less evidence of the field-independent characteristic of being subject-centered. Cano et al. (1991) wanted to know why students, specifically the independent learners, place a high value on being learning-centered. Perhaps the preservice teachers who are field-independent place a high value on being learning-centered as students, but when they start to teach the field-independent characteristic of being subject-centered will become more evident.

Table 4. Personality Types on the Myers-Briggs Type Indicator (n=20)

	Males		Females		All Cases	
Personality Type	f	%	f	%	f	%
Extraversion	3	27.3	6	85.7	9	50.0
Introversion	8	72.7	1	14.3	9	50.0
Sensing	8	72.7	4	57.1	12	66.7
INtuition	3	27.3	3	42.9	6	33.3
Thinking	10	90.9	3	42.9	13	72.2
Feeling	1	9.1	4	57.1	5	27.8
Judgement	5	45.5	3	42.9	8	44.4
Perception	6	54.5	4	57.1	10	55.6
Total	11	100.0	7	100.0	18	100.0

Analysis of the Extraversion-Introversion (EI) dimension showed that 73% (8) of the males were I while 86% (6) of the females were E (Table 5). On the Sensing-Intuition (SN) dimension 67% (12) of the subjects were S and 33% (6) were N. Analysis of the Thinking-Feeling (TF) dimension of the MBTI showed that 91% (10) of the males were T while 43% (3) of the females were T. Overall, 72% (13) of the subjects were T. On the final dimension 56% (10) of the subjects were P while the remaining 44% (8) were J.

Independent learners tend to be intrinsic, but this was not supported by the personality data for the females. The majority of the females were E as well as being field-independent based on their GEFT. Cano et al. (1991) also found that the intrinsic characteristic of field-independent learners was not supported by MBTI scores. Nevertheless, Cano et al. (1991) did find the EI scores consistent with the teaching style preference data. However, the teaching style data in this study was not consistent with scores on the EI dimension. With 55% of the subjects being I, one would not expect the teaching style data to show a preference towards learner-centered instruction as was found in this study. Cano et al. (1991) also found scores on the Thinking-Feeling (TF) dimension to be consistent with GEFT scores. Field-independent learners tended to be a T on the MBTI. Being a "thinker" rather than a "feeler" is characteristic of a field-independent learner. However, in this study females who tended to be field-independent tended to be feelers while the vast majority of males, who were equally divided among field-dependence/independence, were "thinkers".

IMPLICATIONS

Cano et al. (1991) found their results from Ohio perplexing. Overall, these results do not bring much clarity to what we know about the learning styles, personality styles, and teaching styles of preservice teachers in agricultural education.

However, the results of this study do support the statement by Cano et al. (1991) that preservice students do differ in learning styles, personality styles, and their preferred way of teaching. In both studies subjects tended to be field-independent. Additionally, in both studies females tended to more field-independent than the national norm. Why do preservice agriculture teachers tend to be field-independent, especially females? Are field-independent female preservice agriculture teachers better able to adjust to a male dominated field than field-dependent females? More research is needed to investigate the high rate of preservice field-independent females in agricultural education.

Furthermore, in each investigation subjects tended to prefer student-centered instruction. However, in Montana a vast majority were "enablers". This is the opposite from what one would expect from a field-independent learner. Why do these field-independent preservice agriculture teachers, especially the women, have so many field-dependent traits? Additionally, the two studies differed in personality types. Cano et al. (1991) found the majority of subjects to be E, while this study found the majority to be I, especially the males. There were also differences in the Judgement-Perception (JP) dimension and the Thinking-Feeling (TF) dimension.

What are the causes of these differences? Could there be more non-traditional age students in this study than the Ohio study? If so, could this be a source of the differences? The learning style, teaching style, and personality style of many more preservice teachers in agricultural education in many more states need to be determined in order to help answer some of these questions. This study raises more questions than it answers underscoring the need for more research about the characteristics of our preservice teachers as well as the agricultural teacher educators that teach them. However, the results do indicate that preservice teachers do vary in terms of learning, teaching, and personality styles and agricultural teacher educators should take these differences into account while preparing agriculture teachers. Additionally, it is important that preservice agriculture teachers recognize and understand their own individual learning, teaching, and personality styles so that they can make adjustments in their instructional strategies when they encounter students with differing styles.

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Appendix

A Complete Listing of the Paper Proposals Submitted for Consideration for the 1992 National Agricultural Education Research Meeting, St. Louis

A Complete Listing of the Paper Proposals Submitted for Consideration for the 1992 National Agricultural Education Research Meeting.

St. Louis

Community Educational Advisory Councils and Agricultural Education Program Status in Illinois: A Quantitative Perspective
James W. Legacy, Samson O. Apantaku, Southern Illinois University

Assessment of Professional Competencies of Occupational Teachers
Vernon D. Luft, University of Nevada, Reno

A Model for Knowledge Utilization from Adult Agricultural Education
Larry E. Miller, The Ohio State University

Extension Educators' Learning Style Preference and Relationships with Locus of Control and Program Responsibility
Timothy J. Rollins, Edgar P. Yoder, The Pennsylvania State University

Agricultural Interests that Supported the Smith-Hughes Act with Implications for Today's Legislative Process
John Hillison, Virginia Polytechnic Institute and State University, Ray Herren, University of Georgia

The Role of Virginia in the Development of the FFA
John Hillison, Virginia Polytechnic Institute and State University

Secondary Public School Teachers Leadership Abilities
Michael K. Swan, Michael L. Kamrath, North Dakota State University

Educational Instruction Via Interactive Video Network
Michael K. Swan, Jeffery L. Brehmer, North Dakota State University

A Longitudinal Assessment of the Learning and Teaching Styles of Preservice Teachers of Agriculture: 1990, 1991, 1992
Jamie Cano, Bryan L. Garton, The Ohio State University

Learning and Teaching Styles and Their Relationship with Preservice Teachers' Performance in a Methods of Teaching Agriculture Course
Jamie Cano, Bryan L. Garton, The Ohio State University

Safety Conditions and Noise Levels of Common Power Tools and Equipment Found in Vocational Education Laboratories
Glen M. Miller, Clinton O. Jacobs, Steve Schimpp, The University of Arizona

Evaluation of Noise in Vocational Education Laboratories
Glen M. Miller, Clinton O. Jacobs, Steve Schimpp, The University of Arizona

The Achievement of Students Entering the College of Agriculture at the University of Idaho--1985 to 1989
Wayne L. Rush, Lou E. Riesenberg, University of Idaho

Factors Influencing Educational and Career Choice of Talented High School Youth
Marianne L. Houser, Edgar P. Yoder, The Pennsylvania State University

Analysis of Agriscience Teacher Inservice Needs
AnnaBeth Neason, Louisiana State University

Land Grant Institutions--The Rest of the Story
Ray V. Herren, The University of Georgia, John Hillison, Virginia Polytechnic Institute and State University

Motivator-Hygiene Theory and the Job Satisfaction of Six Taxonomies of Agricultural Education Teachers
Jamie Cano, Greg Miller, The Ohio State University

An Editorship, Authorship, Theme, and Topic Analysis of The Agricultural Education Magazine
Jamie Cano, Robert M. Torres, The Ohio State University

Comparison of Deterrents to Nontraditional Male and Female Enrollment in Secondary Agricultural Education Programs in Nebraska
Lloyd C. Bell, Susan Fritz, University of Nebraska-Lincoln

Incorporating Indigenous Knowledge Systems into Agricultural and Extension Education Programs: A Study of the Perceptions of Extension Professionals
B. Rajasekaran, Robert A. Martin, Iowa State University

Benefits and Problems of Part-Time Agricultural Employment of Secondary Agriculture Teachers on Their Programs as Perceived by Head Teacher Educators and Head State Supervisors
Roy Harper, Moorefield High School, Stacy A. Gartin, Layle D. Lawrence, Robert A. Dailey, West Virginia University

Likely Outcomes of Semester Based Coursework on High School Agriculture Students and Programs
Erwin Berry, St Marys High School, Layle D. Lawrence, Stacy A. Gartin, Kerry S. Odell, West Virginia University

An Assessment of Microcomputer Utilization in West Virginia Secondary School Agriculture Programs
Kerry S. Odell, West Virginia University

Self-Esteem Ratings of High School Freshmen in Agriculture I and Seniors in Agriculture IV in the Northwestern FFA District of West Virginia
Barbara A. Copenhaver, Kerry S. Odell, Layle D. Lawrence, Sandra B. DeCosta, West Virginia University

Drug Use by Agricultural Education Students
Matt R. Raven, Montana State University

A Follow-Up Study of the Graduates from the Master's Program in Agricultural and Extension Education at Mississippi State University
David G. Mitchell, Jasper S. Lee, Mississippi State

Assessing the Intended and Actual Levels of Cognition in Ohio Cooperative Extension Service County Agricultural Agents'/State Agricultural Specialists' Instructional Programs
Ali K. Ismail, Larry E. Miller, The Ohio State University

A Core Curriculum for a National Middle School Agricultural Education Program: An Approach to Curriculum Development Using a Modified Delphi Technique
Martin J. Frick, Purdue University

The Feasibility of a Catfish Farming Curriculum in Georgia's Agricultural Education Program
Milton T. Britton, Oglethorpe County High School, Maynard J. Iverson, The University of Georgia

Demographic Analysis of the Membership in the National Young Farmer Educational Association
Dale R. Carpentier, Maynard J. Iverson, The University of Georgia

The Forest Industry in the 21st Century: A Delphi Study with Implications for Agricultural Education
Alan D. McAllister, Maynard J. Iverson, The University of Georgia

The Relationship Between the Quality of the Supervised Agricultural Experience Component of the Secondary Agriculture Program in North Carolina and the Instructors' Levels of Time Management
Ricky Warren, Jim Flowers, North Carolina State University

The Perceptions of Iowa Young Farmers Regarding the Role of International Agriculture in Agricultural Education in Iowa
Kamal Ali Elbasher, Robert A. Martin, Iowa State University

Stage of Adoption and Level of Knowledge of Sustainable Agricultural Practices by Central Iowa Farmers
Julia A. Gamon, Iowa State University

Entry Year Agricultural Education Teachers' and Entry Year Assistance Committee Members' Perceptions of the Oklahoma Entry year Assistance Program
Miguel Barrera, Eddy Finley, Oklahoma State University

Perceptions of the Effects of Education, Credit, and Extension Service on Small Farmer Productivity in the Lower Shabelle Region of Somalia
Gary S. Straquadine, Abdullahi Mohamud Haybe, Utah State University

Profile of the Agricultural County Extension Agent in Utah as Information Users
Gary S. Straquadine, Geovanni Jimenez, Utah State University

The Affect of Learning Style on Academic Achievement and Perceptions of Two Methods of Instruction
David L. Marrison, Martin J. Frick, Purdue University

A Three-Year National Study of Teacher Educator, Supervising Teacher, and Student Teacher Perceptions Concerning the Selection of Student Teaching Centers and Supervising (Cooperating) Teachers in Agriculture
Alvin Larke, Jr., Gary E. Briers, Texas A & M University, Richard J. Norris, Southern Arkansas University

Vocational Forestry Education Curriculum
Grant M. Tipton, III, Alan A. Kahler, W. Wade Miller, Iowa State University

The Effects of Temperature on Reading Comprehension and Task Completion on Agricultural Engineering Technology Students
R. Lane Gregory
Larry R. Jewell, Barbara Malpiedi Kirby, North Carolina State University

The Relationship Between Innovation Perceptions and the Adoption of Sustainable Agriculture by Iowa's Young Farmers: Implication for Agricultural and Extension Education
Adewale Johnson Alonge, Robert A. Martin, Iowa State University

State Agricultural Education Supervisor Perceptions and State-Level Policies Relevant to Middle-Grade Agricultural Education
R. Kirby Barrick, Matthew Hughes, The Ohio State University

An Assessment of Personality Styles of Agricultural Education Preservice Teachers
Jamie Cano, Bryan L. Garton, The Ohio State University,
June Bargar

Effectiveness of Computer Assisted Instruction (CAI) vs. Traditional Laboratory Instruction (TLI) in Teaching Electrical Wiring Skills
Stephen E. Poe, Utah State University, R. Mack Strickland, Purdue University

Characteristics of Literature Cited in the Journal of Agricultural Education: An Empirical Study
Rama B. Radhakrishna, Gary B. Jackson, Dennis W. Eaton, The Pennsylvania State University

The Relationship Between the Extent of Use of the Problem-Solving Approach During Student Teaching and the Extent of Use of the Problem-Solving Approach by First-Year Teachers of Vocational Agriculture
Steven Ray McKee
J. Robert Warmbrod, The Ohio State University

Extent of Use of the Problem-Solving Approach by First-Year Teachers of Vocational Agriculture
Steven Ray McKee
J. Robert Warmbrod, The Ohio State University

Farmer Perceptions of Soil and Water Conservation Issues: Implications to Agricultural and Extension Education
Thomas H. Bruening, Robert A. Martin, Iowa State University

The Relationship Between Self-Esteem and Postsecondary Vocational-Technical Education
M. Susie Whittington, Pat R. Whittington, Lou E. Riesenberg, University of Idaho

Assessment of Effectiveness of Idaho Postsecondary Vocational-Technical Education as Perceived by 1987-88 Program Competers
Pat R. Whittington, M. Susie Whittington, Lou E. Riesenberg, University of Idaho

Teacher Perceptions of Agriscience and Natural Resources Curriculum
James J. Connors, Jack Elliot, Michigan State University

FFA New Horizons Readership Survey
Jack Elliot, Kirk Heinze, Jim Connors, Michigan State University

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